The Chemical Age

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The Alkaloid Industry

MORE than 300 years ago Shakespeare was able to write in mediæval England of "the insane root that takes the reason prisoner," and many hundreds of years earlier the eastern countries had discovered the narcotic properties of opium. The means by which this deadly plant was translated into a benefactor of mankind provide one of the romances of science—a romance that lurked behind much of the account that was recently given to the London Section of the Society of Chemical Industry by Dr. H. M. Wüest of "A hundred years of the alkaloid industry." If the translation is yet incomplete and there is still more of the devil than the angel in opium, that is not the fault of the chemist, but of the weaknesses of human nature.

Perhaps few chemical discoveries dating back more than a century can be said to have originated from "pure" research. Research was in those days means directed towards an end which the investigator deemed to be practical. The object might be no more practical than the Philosopher's Stone—but to the mediæval world that appeared eminently practical. So it came about that one of the earliest serious investigations into organic chemistry was concerned with that highly complex collection of bodies, the alkaloids, and the reason was the desire to improve the valuable powers of opium, even then administered in medicine as an antidote to pain. These investigations arose at a time when only some 30 or 40 organic compounds were known, and before the synthesis of urea by Wöhler in 1828 showed that animal and other "organic" products were not *necessarily* the produce of living matter. It is hardly possible for us to-day, with our well-equipped laboratories, and our magnificent libraries telling of an ever-rising tide of scientific discovery in all parts of the world, to visualise the difficulties under which the early investigators worked. There were difficulties of knowledge, difficulties of apparatus, difficulties of technique, and a total lack of guidance from those sign-posts with which we now become familiar at a comparatively tender age. Nevertheless the genius of those early workers founded an industry that to-day has grown to considerable dimensions, and may have yet another and more glorious chapter before it.

Prior to 1806 it was thought that plants could only produce neutral or acid bodies. When Derosine in Paris in 1803 first obtained a crystalline salt from opium, he concluded that its alkaline properties were due to the alkali used in its purification. Likewise Seguin who examined morphine in 1804 did not recognise it as having any special properties. It was left to Sertürner, a young pharmacist of Hanover, to recognise in 1806 that he had obtained from opium a crystalline body possessing alkaline properties, and that a new class of compounds had been discovered. Even then it was not until he published his now famous paper in 1817, "Uber das Morphium, eine neue salzfähige Grundlage und die Mekonsäure als Hauptbestandtheile des Opiums," that scientific interest was awakened.

Immediately there came a flood of discovery, starting with narcotine and emetine in 1817, veratrine and strychnine in 1818, brucine and piperine in 1819, caffeine, cinchonine, quinine and solamine in 1820, until by 1835 some 27 alkaloids had been discovered, a number which had been extended to 200 by 1903 and to 400 to-day. Almost immediately a chemical industry sprung up. Quinine sulphate was made in Jersey in 1820 by Dr. A. Low, and in England by Morson in 1821, and by the Howards in 1827, a firm still engaged in this industry. Another firm almost equally old in this manufacture is that of Messrs. T. & H. Smith, of Edinburgh, who were founded in 1827. Several alkaloids were discovered by the founder of this firm.

It is an interesting fact that most major alkaloids are prepared from cultivated plants, the only wild plant used being nux vomica. On the other hand, the minor alkaloids are obtained from wild plants. The difficulty of controlling the undesirable uses of the alkaloids, and particularly of opium extract, has often been discussed and the uses of the narcotic drugs in medicine are such that their disappearance cannot be lightly regarded. Some of them, such as quinine, which alone has rendered many tropical parts of the earth habitable, are powers for good only. Nevertheless, some of the most eminent among those now engaged in research upon alkaloids are disposed to believe that the alkaloid industry as we know it will disappear to be replaced by an extension to that industry in which new compounds will be built up from the alkaloids. It might be that if the many opium alkaloids could be synthesised, for example, the authorities throughout the world could stamp out the opium poppy.

Brilliant as are the researches into alkaloid synthesis, many of them made in this country, we are still no nearer the general solution of the problem. In particular, there seems to be as yet no likelihood of synthesising strychnine, quinine or morphine. It is a curious fact that the last fundamental discovery of importance in the alkaloid industry was stated to have been made some 50 years ago, and this fact was cited in support of the suggestion, made in the discussion which followed this interesting paper, that the alkaloid industry is becoming moribund.

Notes and Comments

The Streatfield Lecture

THE 20th Streatfield Lecture, delivered by Sir Martin Forster at the Institute of Chemistry on Friday of last week, was another excellent address in the series given annually by a former student of Streatfield at the Finsbury Technical College. Sir Martin said that the deepest impressions which Streatfield left on him were his sympathy, his buoyant enthusiasm for chemical practice, and sound craftsmanship. The work at Finsbury was a genuine treasure hunt for knowledge in a very friendly atmosphere. Streatfield's animating influence received very small material reward, so small as to be tragic and gruesome. The happiness he enjoyed in the laboratory was obtained independently of social comforts. As Sir Martin so aptly phrased it—" service to God need not preclude common courtesy to Mammon," and he felt that in acknowledging our debt to Streatfield, we might be doing restitution. Of the ways in which tribute can be paid to the memory of a famous man, there is none more effective than a personal description of him, his life and his work, given by one who knew him closely, for by this means not only is his picture revivified in the minds of those acquainted with him but those who knew him not thereby gain a valuable appreciation of the man and what he stood for. So it is with Streatfield; as Sir Gilbert Morgan said, in the discussion which followed this interesting lecture, there is a spirit of communion on such occasions.

Cost of Air Raid Precautions

THE seriousness with which the Government view the need for providing strong anti-air raid measures is brought out in the announcement that it proposes to pay the whole cost of most of the material and equipment required for local air raid precautions services. This is as it should be, but it is often considered that first, the likelihood of any actual raid in anything approaching the near future is exceedingly remote, and second, that the destruction caused by such a raid is greatly over-estimated. The first point is solely determined by political considerations. As to the second, Professor J. B. S. Haldane, at the United Services Institution, maintained that calculations about gas were often based on a ridiculous misconception. It had been pointed out that ten tons of gas would render the atmosphere poisonous over an area of several square miles if rightly distributed. It was also true that one ton of bullets would kill the entire British Army if rightly aimed. It was not likely that a hostile air force would be able to drop bombs exactly where they wished.

The State and Industry

THE Prime Minister has been addressing the Association of British Chambers of Commerce on the relations of the State and industry. He pointed out that these relations tended all the time to grow in intimacy and complexity. He welcomed that fact, which he believed to be valuable for industry and the country generally, but, broadly speaking, he would say that the proper function of the Government in relation to industry was to create the conditions for trade and commerce to be most successfully carried on, only exercising so much control as may be necessary in the public interest. This was very moderately put, and the business community would not dispute Mr. Chamberlain's claim that the recent Governments of which he has been a prominent member have a fine record in the financial sphere. At the same time, business men cannot agree that Government interference in industry has been an unmixed blessing. Mr. Chamberlain said quite rightly that the voluntary system was preferred to compulsion in the relations of State to industry, but overlooked the serious breach made in the voluntary system by the marketing board and quota systems, many of which are palpably breaking down. What business men feel is that national prosperity is being restored by their efforts, notwithstanding the many handicaps imposed by meddlesome Government Departments. Their steadiness of purpose is in marked contrast to the panic-mongering of politicians, more particularly in international affairs. While the Stock Exchange has been unfortunately reacting to these influences, the great body of manufacturers and traders have stuck steadfastly to their jobs. Higher Board of Trade returns, better employment figures, and healthier company statements are the business man's stimulating reply to the trouble-makers who are constantly disturbing the political waters.

Technical Information

NATURALLY research organisations serving different types of industries differ in detail, according to the nature of the products involved and the relations of the body to the industries served, but one feature common to all is to know as much as possible about the product and to supply the information to the industry. This is carried out through a bureau of technical information which is a clearing house for all the knowledge possessed by the organisation as a whole. Number 6 of the miscellaneous publications of the International Tin Research and Development Council is concerned with the rôle of technical information in industrial research and development, describing the scheme followed by the council. Briefly, the information is collected by a survey of about 220 periodicals, abstracts published by scientific societies, patent literature, catalogues and trade literature, and correspondence with scientific workers, including visits to works and laboratories. All the information is filed and card indexed. The information is distributed inside the organisation, through answers to technical inquiries, and publications.

The Study of Gases

PROBLEMS associated with the thermal changes in hydrocarbon gases can be investigated either by the methods of pure organic chemistry, thermodynamics, or chemical kinetics. Investigations of the first type yield no information as to the basic nature of the reactions involved, and thermodynamics give the directions and limits of a chemical process but cannot indicate why or how the process commences or how rapidly it will proceed when it has started. This is provided by knowledge of chemical kinetics. Dr. Morris W. Travers has given an illuminating account of his researches in the study of gases, more particularly in the realm of chemical kinetics, before the Institute of Fuel. It was interpreted from the results that the process seems to be initiated by collision of two molecules, which may not be exactly alike, and that this seems to lead to the formation of some kind of complex, which is stable enough to be classed as a chemical compound, though it cannot be isolated. This work, which is being examined from the strictly scientific standpoint, may have important bearings on some industrial operations.

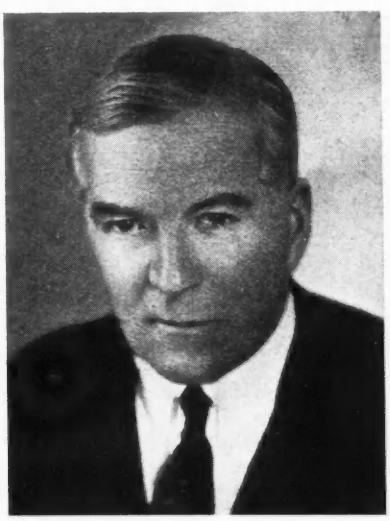
Association of British Chemical Manufacturers

Retrospect of Twenty-one Years of Important Work

THE 21st annual general meeting of the Association of British Chemical Manufacturers was held in London on October 14, with Mr. E. Wallace in the chair. In moving the adoption of the annual report for the year ending May 31, 1937, Mr. Wallace said that as seen from the report, the Association has had another very active and useful year of work on behalf of the chemical industry. He commented on a few items of major interest in the report and then, as this is the 21st anniversary of the Association, he reviewed briefly the main events of the past 21 years, so as to provide a retrospect of the important part the Association has played in the development of the industry.

Prominent Items of the Annual Report

In the section of the report dealing with the Import Duties Act, said Mr. Wallace, mention is made that it was possible for the firms concerned to settle two of the cases (celluloid, sodium chlorate) by negotiation with their competitors abroad. These negotiations became practicable on a basis equitable to this country, only when the cases had been advertised and the foreign importers were faced with the possibility that an increased duty would be imposed in the near future. But experience has shown that in some cases mere advertisement is not sufficient to make the foreigners reasonable in their demands, especially when they are so heavily protected in their own markets that retaliation is impossible. Further, many foreigners continue to hold the view that we are still a free trade—or free import—country at heart, and that we are not really determined to impose fully protective tariffs however vigorous and unfair the competition with which we have to deal. In such cases, the Association would urge the Import Duties Advisory Committee to take the step of recommending a substantial tariff to enable our manufacturers to negotiate on equal terms, on the understanding, if necessary, that the duty will be reduced if and when an equitable arrangement has been attained. They did that with conspicuous success in the case of steel. Similar action in other cases would have a salutary effect as it would show our competitors that the Government intend to give the British manufacturer full support and do not expect him to go unarmed into what would otherwise be an unequal contest. The interests of users would not be prejudiced, because whether or not the British makers gave satisfactory price assurances, the Import Duties Advisory Committee has always the power to recommend the removal of the additional duties if the British consumer is being exploited.



Mr. E. Wallace.

The Trade Agreement with Canada, continued the chairman, marks a welcome advance in that for the first time it introduces provisions for dealing with dumping. Though the measures proposed do not go as far as most of us would like, they concede the principle of anti-dumping and are an important step forward, the significance of which should be noted by our competitors.

Since the report was written, it is gratifying to report that our chemical trade with Poland has made some progress. For the first six months of this year we secured 8.91 per cent. of the total imports into Poland as compared with 7.30 per cent. last year, the value for the six months being 2,719,000 zloty, as against 4,666,000 zloty for the whole of 1936.

The sections relating to the new Factories Act, to safety and to the transport of dangerous substances by road indicate the influence which the Association is able to wield with Government Departments, and show how by amicable negotiation it is possible to arrange for problems to be settled on a harmonious basis which is satisfactory both to the Government and to the industry. We hold strongly that in regard to safety, better results can be obtained from voluntary effort than by legislative compulsion so long as industry faces the problems with the interests of the worker at heart.

He commented only on one other point in the Report, namely the section relating to chemical trade. To date, chemical exports show a welcome increase of about 20 per cent. over the figures for the same period of 1936.

History of Association's Activities

Mr. Wallace then gave a very brief historical outline of the main activities of the Association during the past twenty-one years.

Early in 1916, a Joint Committee of the Chemical Society, the Society of Dyers and Colourists and the Society of Chemical Industry met to consider the best methods of promoting co-operation between British chemical manufacturers, the need for which had become obvious on account of the special conditions created by the Great War. As the outcome of the deliberations of this Joint Committee, a meeting of chemical and allied manufacturers was held on May 23, 1916, at the rooms of the Chemical Society, Burlington House. At this meeting it was agreed to form an Association, and its formal Incorporation took place on December 28, 1916. Dr. Charles Carpenter of the South Metropolitan Gas Company was elected the first chairman, and Sir William Pearce, M.P., the first honorary treasurer. The initial membership was 110 firms, representing a capital of £39,000,000. While the actual number of members has not shown any great increase since then, the capital represented in the chemical and allied industries by the present membership is well over £200,000,000.

The first Annual General Meeting was held on July 12, 1917, when the proposed resignation of Sir Charles Bedford, who had been appointed the first General Secretary in August, 1916, was announced.

Mr. Woolcock's General Managership

On February 14, 1918, Mr. W. J. U. Woolcock was appointed General Manager of the Association, and the following brief record of important events during the subsequent 10 years gives some idea of his activity in making the Association of real service to the chemical industry of the country.

The first issue of the Association's Directory "British Chemicals and Their Manufacturers" was made in 1919.

In July, 1920, the British Chemical Plant Manufacturers' Association was formed as a result of action taken by the Association to bring the plant and chemical manufacturers into closer co-operation, a very valuable move.

On January 15, 1921, the Dyestuffs (Import Regulation) Act, 1920, came into force. In the passage of this Act the Association played a very important part.

On October 1 of the same year, Part I of the Safeguarding of Industries Act, 1921, relating to Key Industries, and covering fine chemicals, *inter alia*, came into operation.

In February, 1922, the first representative chemical exhibit was organised by the Association at the British Industries Fair.

In 1924 and 1925 the Association organised the very successful Chemical Section of the British Empire Exhibition at Wembley.

In 1926 a Finance resolution extended the Key Industry Duties under Part I of the Safeguarding of Industries Act, 1921, for 10 years from August 19. The Fine Chemical Group submitted a comprehensive case in respect of fine chemicals to the Board of Trade Committee which inquired into the operation of the Act during the previous 5 years.

In 1927 the Association's Works Technical Committee, under the chairmanship of Dr. E. F. Armstrong, commenced its work on safety by the preparation of Model Safety Rules for use in the chemical industry, issued in provisional form in 1929. The progressive work of this Committee is now a regular feature of the Association's activities and has been valuable in promoting the cause of safety.

Appointment of Mr. J. Davidson Pratt

On April 30, 1928, Mr. Woolcock resigned his position as General Manager and Secretary of the Association, and Mr. J. Davidson Pratt, Chief Superintendent of the Chemical Warfare Research Department of the War Office, was appointed.

In 1929 the Association undertook a detailed review of British patent legislation in connection with the investigation of this subject by a Departmental Committee, the work of which culminated in the Patents and Designs Act, 1932. Many modifications of great importance to the chemical industry were secured by the Association's efforts.

In 1930, as the result of action taken by the Association through a conference of chemical organisations, the British Engineering Standards Association was reconstituted as the British Standards Institution, with a Division dealing with standardisation in relation to chemistry. This Division has done very useful work.

In December of the same year, after various vicissitudes in Parliament, the Dyestuffs (Import Regulation) Act, 1920, was extended for 1 year under the Expiring Laws (Continuance) Act, 1930, and again by the corresponding Acts of 1931 and 1932.

On March 1, 1932, the Import Duties Act, 1932, came into operation, having been preceded by the Abnormal Importations (Customs Duties) Act, 1931, passed in November of that year. This marked the end of the era of free trade or of free imports as many prefer to call it. The chemical industry has no cause to regret the passage of this Act, which has been so excellently operated in the national interests by the Import Duties Advisory Committee, from whom, as mentioned earlier, we may perhaps hope for further wise help in strengthening our bargaining power opposite foreign industries.

In July of that year the Association was represented by its Chairman, Dr. E. F. Armstrong, and the General Manager, at the Imperial Economic Conference at Ottawa, with material benefit to our industry.

In 1933 our Articles of Association were revised to bring them more into line with post-war conditions. In the same year the Association investigated and reported to a Government Committee on trade mark legislation, the activities of which culminated in the Trade Marks (Amendment) Act, 1937.

On March 28, 1934, the new Dyestuffs (Import Regulation) Act was passed continuing indefinitely the import prohibition on dyestuffs and intermediates with minor modifications.

Mr. E. V. Evans, the new Chairman of the Association of British Chemical Manufacturers.

During 1934 and 1935 the Association was very active in connection with the new poisons legislation recommended by the Poisons Board under the Pharmacy and Poisons Act, 1933. As the result of the representations which it made on behalf of the chemical industry, substantial modifications of great importance to our industry were secured, another indication of the great value of collective action in dealing with legislative matters.

In 1935 the Association organised a British Chemical Exhibit at the Brussels Exhibition which received very eulogistic comment from all quarters, and was awarded the highest distinctions in every class for which it was eligible.

In 1935 and 1936 the Fine Chemical Group presented a detailed case for the continuance of the Key Industry Duties to the Departmental Committee which investigated the matter. The Duties were continued for a further 10 years on the desired lines by the Finance Act, 1936.

This brings us to the work of the past year which is fully dealt with in the annual report. The very brief outline given is ample testimony to the value that our Association has been to the chemical industry of this country and justifies fully the foresight of those who were responsible for the foundation of the Association 21 years ago. The story would have been very different had there not been an active and representative organisation to look after our interests, to advise and help the Government in their dealings with the industry, and to promote a spirit of harmony and co-operation among chemical manufacturers. During these 21 years, the Association has been indeed fortunate in the chairmen who have controlled its policy—Mr. Wallace said modestly that he referred to his predecessors—and it will be useful to recapitulate these distinguished names:

1916-1918 Dr. Charles Carpenter.
1918-1920 Mr. R. G. Perry.
1920-1922 Sir John Brunner (died January 16, 1929).
1922-1924 Sir Max Muspratt (died April 20, 1934).
1924-1926 Mr. (now Sir David) Milne-Watson).
1926-1928 Mr. C. A. Hill.
1928-1930 Dr. (now Sir Christopher) Clayton.
1930-1933 Dr. E. F. Armstrong.
1933-1935 Dr. F. H. Carr.

Before concluding, he expressed the keen regret of the Council, which he was sure would be shared by all members, that Mr. Norman Holden had found it necessary for medical reasons to withdraw from active participation in their work, and to decline the office of chairman which it was hoped he would assume after the meeting.

Tribute to Council and Staff

Mr. Wallace said that he was now nearing the end of his tenure of office as chairman, and that he had had two very pleasant years in that office and owed this to his colleagues on the Council, who at all times had made things very easy for him. He expressed his very sincere thanks to them, and also his indebtedness to all members of the Association, especially those who had served on the various committees, the valuable work of which they all knew and appreciated.

Last of all he paid a tribute to the work of the staff and to their unswerving loyalty to the Association and its interests. The Association could not be better served by their staff. Without them the Association could not have achieved what it had. The services of their General Manager had been so much appreciated that they were asked some months ago to allow him to undertake additional heavy responsibility in connection with a closely allied organisation, the British Road Tar Association. They were at first reluctant to consent as they

feared the burden might be too heavy even for such a strong and willing horse, but he assured them that with additional assistance, which he had now been able to secure, he would be able to undertake the extra work without in any way impairing the activities of the Association. All wished him every success in his new task. To him and to every member of his staff, especially to his two henchmen, Mr. Drake and Mr. Holden, and not forgetting Mr. Heap, their dyestuffs expert, and Mr. Lukes, the indefatigable Secretary of their Traffic Committee, they expressed their very sincere appreciation of the work they were doing for them.

The following officers were elected for the ensuing year at the general meeting and at the Council meeting immediately following:—President: Dr. F. H. Carr, C.B.E., F.I.C. Vice-presidents: Dr. E. F. Armstrong, F.R.S., J.P., Dr. Charles Carpenter, C.B.E., M.Inst.C.E., Sir Christopher Clayton, C.B.E., Ph.D., F.I.C., Mr. C. A. Hill, B.Sc., F.I.C., Sir David Milne-Watson, Bt., D.L., LL.D., Mr. R. G. Perry, C.B.E., Mr. E. Wallace. Honorary Vice-Presidents: Sir Martin O. Forster, F.R.S., Mr. Norman N. Holden, Mr. David Lloyd Howard, J.P., Lord McGowan, K.B.E., Sir Robert Mond, F.R.S.E., M.A., J.P. Chairman: Mr. E. V. Evans, O.B.E., F.I.C. Vice-Chairman: Mr. R. Duncalfe. Honorary Treasurer: Mr. C. F. Merriam.

Sir Samuel Hoare was the principal guest at the annual dinner of the Association which was held at Grosvenor House, Park Lane, on October 14, at which Mr. E. Wallace presided. There were about 300 guests present, among them being Sir William Brown, Sir Henry Sutcliffe Smith, Lord May, Sir Christopher Clayton, Sir Robert Pickard (president of the Institute of Chemistry), Sir Robert Robertson, Sir Martin Forster, Dr. E. F. Armstrong, Dr. J. J. Fox, and Professor F. G. Donnan. Mr. E. V. Evans (the newly-elected chairman of the Association) proposed the toast of the guests, to which Sir Samuel Hoare, Sir William Brown, and Sir Percy Ashley replied. In addition to Mr. Wallace, the chairman, other speakers were Mr. J. Davidson Pratt, general manager of the Association, and Mr. W. J. U. Woolcock.

Death of Lord Rutherford

Famous Investigator of Atomic Structure and Transmutation

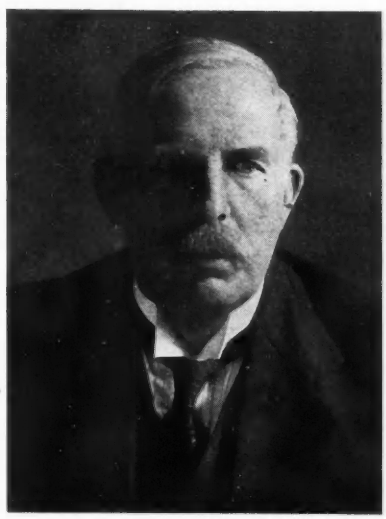
LORD RUTHERFORD, O.M., F.R.S., the famous experimental physicist, died on Tuesday at Cambridge at the age of 66. He was born at Nelson, New Zealand, and after a brilliant career at New Zealand University he was elected in 1894 to an 1851 Exhibition Science Scholarship. He went to Cambridge and entered Trinity College, where he worked with Sir J. J. Thomson on the subject of the conduction of electricity through gases by the agency of ions. These researches led to his appointment in 1898 as Professor of Physics at the McGill University, Montreal.

Before 1900 there was little indication that the atom had any structure or was other than a hard, massive and unalterable particle. Radioactivity was discovered in 1896 and the work of Rutherford and Soddy at McGill from 1900 onwards demonstrated that radioactivity was the explosive disintegration of the individual atoms of an element, expelling with enormous velocity α-particles, which were later shown to be electrically-charged helium atoms; β-particles, which were shown to be electrons, and γ-rays, which were shown to be radiation of a type similar to X-rays. By this process the atom became converted into the atom of a different element. Rutherford and Soddy worked out genealogical trees showing how the parent elements, uranium and thorium, broke down and after giving rise to a dozen or more different elements ended up as lead.

Theory of Atomic Structure

Rutherford became a Fellow of the Royal Society in 1903. In 1907 he left Montreal and became Professor of Physics at Manchester University. In 1911 he put forward his theory of atomic structure. He postulated that the atom consisted of a loose cloud of very light electrons surrounding a very minute, heavy, positively charged nucleus, the size of which was very small in comparison to the minute atom itself, while its mass and charge were large enough to deflect an α-particle through a large angle. The nucleus was, he supposed, a very compact structure of protons and electrons. This theory has, in essentials, stood the test of time.

He was knighted in 1914 and in 1919 he became Cavendish Professor of Experimental Physics and Director of the Cavendish Laboratory at Cambridge. From that year he gave his attention to the transmutation of the elements by artificial means. In 1919 Rutherford demonstrated the first artificial transmutation by showing that when nitrogen gas was bombarded with α-particles, hydrogen nuclei (protons) were expelled from the nuclei of the nitrogen atoms; and by 1924 most of the elements had—on an incredibly minute scale—been transmuted by him. From 1927 onwards his studies of the transmutations of elements and of the velocities of the particles emitted by radio-elements led him to the view that the minute nucleus is itself a complex structure with an inner nucleus and satellites. Work is still proceeding on this theory.



Lord Rutherford.

In 1931 he was created first Baron Rutherford of Nelson, New Zealand, and Cambridge. He received the Nobel prize for chemistry in 1908, was president of the Royal Society from 1925-1930, and president of the British Association in 1923. From 1930 to his death he was chairman of the council of the Department of Scientific and Industrial Research.

Lord Rutherford will be buried in Westminster Abbey at noon on Monday. He will be the first distinguished scientist to be buried in the Abbey for many years. Lord Kelvin was buried there in 1907. The only other scientists to be interred there were Sir Isaac Newton, Sir John Herschell, Charles Darwin and Professor J. P. Joule.

Letters to the Editor

Oil from Coal

SIR,—We should like to comment on some points which have been raised in your editorial of October 2 and subsequent correspondence on the subject of oil from coal.

It appears to have been overlooked that the cost figures given in the report of the Commonwealth Hydrogenation Committee are in Australian currency and should be reduced by 20 per cent. to convert them into sterling. As these figures have been rather freely quoted it appears desirable to emphasise this point as well as the fact that the figures relate to Australian conditions where freight and erection costs would be higher than in this country.

The data which have been used by the Commonwealth Hydrogenation Committee are those which are given in greater detail in the report by Sir David Rivett, of the Australian Council for Scientific and Industrial Research, dated November, 1936. In Sir David Rivett's report the limitations on the accuracy of the basic figures are very fairly set out. A good deal of misunderstanding appears to have been caused through the circulation of summaries of these reports which fail to give a correct impression of their contents.

We should like to stress the point made in your leading article of October 2 regarding improvements that have been made in the Fischer-Tropsch process since the data in the Australian reports were obtained. We have been engaged for more than two years in a detailed study of this process and have had opportunities, which have not been available to anybody else in this country, of examining the process in all its details and forming an impartial judgment of its present and potential status and importance.

We are, therefore, in a position to confirm that important improvements have been made and are still being made. The scale on which the process is being exploited in Germany and the rapidity with which it is being developed must obviously result in a much more rapid rate of progress than is normally the case for industrial processes. This has clearly an important bearing on the capital costs though account must also be taken of the general rise in prices since the Australian figures were prepared. This rise in prices would, however, equally affect any alternative processes.

The figures given for the relative capital costs per ton of oil per year, namely, £73, for the hydrogenation process and £100, for the Fischer-Tropsch process (Australian currency) are quite misleading unless it is clearly realised that the figure for the hydrogenation process relates to an output of 150,000 tons per year, while that for the Fischer-Tropsch process relates to an output of 30,000 tons per year. Obviously it is not legitimate to compare the two figures for capital cost per unit of production when one plant is five times the size of the other.

The final point which we should like to emphasise is that the only processes for the complete conversion of coal into oil, which are operating on a commercial scale and in which the major technical problems have been solved, are the Fischer-Tropsch process and the hydrogenation process.—Yours faithfully,

W. R. ORMANDY.
A. J. V. UNDERWOOD.

38 Victoria Street,
London, S.W.1.

Proposed Supplemental Charter of the Institute of Chemistry

SIR,—The Institute of Chemistry's proposed Supplemental Charter reveals an extraordinary position. The Institute now recognises the fact that there are other bodies in existence who qualify chemists. So much does the Institute recognise this fact that it proposes to admit such chemists without further examination!

Quite recently the Institute assured the Poisons Board of the Home Office that there were no such other bodies who could qualify chemists. It will be interesting to know how the Institute proposes to square these two statements to the Government.

It is now obvious that the Institute is mainly concerned with feathering its own nest and is not primarily concerned with the profession as a whole. If this is not the case, how comes it that such a professional body can so readily admit what it so recently denied?

What does the Home Office think of this? If the Institute now confesses the existence of other bodies capable of qualifying chemists, is there any further need for the Government to look only to the Institute when it requires chemists? Is there any spokesman in the Government who can give an opinion on this?—Yours faithfully,

ARTHUR J. BAKER.

SIR,—The published details of the Institute of Chemistry's proposed Supplemental Charter raises a point of paramount importance to those chemists who are not, and have no desire to be in any way connected with the Institute.

It will be remembered that during the recent Poisons Board legislation the Institute most definitely stated that it constituted the only body capable of assessing the competence of chemists. It has almost managed to convince the Government of this pet desire.

Now, in what appears to be an effort to crowd out any other society, the Institute blandly turns about and proposes to admit chemists who are qualified by other bodies, *i.e.*, the Universities. It thus openly admits, and makes public parade of the fact that there *are* other bodies capable of assessing the competence of chemists, and this statement, sir, is so directly the reverse to the protestations made by the Institute to the Poisons Board that I trust this *volte-face* will duly be pointed out to the Home Office with strong recommendations that, as the Institute now recognises the qualifications of chemists not its members, and is prepared to admit them without examination, the situation needs immediate revision so that members of societies such as the B.A.C. and graduates of Universities are recognised as qualified chemists by the Government without further reference to the Institute of Chemistry, which has, by this obvious effort to render itself important, nicely blown its own gaff.—I am, sir, Yours, etc.,

EDWARD MILLIGAN.

[Correspondents on this subject seem to be labouring under two misapprehensions. First, for twenty years the Institute of Chemistry has admitted to its associateship university graduates with first or second class honours in chemistry, on complying with certain conditions, without any examination being conducted by the Institute. Second, the Secretary of the Home Office, by advice of the Poisons Board, made it clear that not only was a certificate of competency necessary to fulfil the requirements of the Poisons Rules, but persons holding it should be permanently under some professional discipline, so that their qualifications should be capable of removal if necessary. According to the Poisons Board, the Institute of Chemistry was the only body that complied with these two requirements.—Ed.]

NUMEROUS applications of niobium metal are outlined by Dr. K. H. Kreuchen in *Chemische Fabrik*, October 13. With a close outward resemblance to its sister-metal, tantalum, it is more ductile than the latter and can be more easily worked into fine wire and thin sheet. It also resembles tantalum in its marked ability to absorb gases at temperatures over 300° C. With the exception of hydrofluoric acid, concentrated sulphuric acid, concentrated hydrochloric acid and strong alkalis, niobium is strikingly indifferent to chemical agents, even including hot aqua regia and chromic acid mixture. Tantalum can be advantageously replaced by niobium in chemical plant because of its mechanical qualities and resistance to corrosion.

White Pigments in the Rubber Industry

By
T. L. GARNER, M.Sc., F.I.R.I.

THE chief compounds used in the rubber industry which fall into the classification of white pigments are lead-free zinc oxide, lithopone, and titanium white. Of these, zinc oxide is the most important, and it is extensively used for reinforcing purposes in white and light coloured goods, while its use is desirable to the extent of two or three per cent. in most mixings to activate the organic accelerators employed to increase the rate of vulcanisation. Zinc oxide was at one time the best reinforcing agent available, and it was used for many years in motor tyre treads for this purpose. Now, of course, carbon black gives very greatly superior results and has entirely replaced zinc oxide as the chief ingredient in tread stocks to give long wear.

Lithopone is cheaper by volume than zinc oxide, and is very largely used for white goods, finding particular favour in extruded, open cured articles such as pram tyring, because of the smooth running and soft, elastic type of stock thus produced. Titanium dioxide, while the most expensive pigment, gives excellent colouring and is in demand for goods where the colour must be superior white.

Preparation and Properties of Zinc Oxide

Zinc oxide is prepared by two general processes of manufacture, the American and the French processes, and its properties vary somewhat according to the method used, and also the details of the process. American zinc oxide is obtained in general from ores, such as Willemite, Zn_2SiO_4, or Zincite, and contains sulphur absorbed on or combined with the oxide. Most French zinc oxide (and some American) is obtained from zinc blende, the oxide being first reduced to spelter in order to purify from lead, and the oxide formed by heating the spelter in air. Sulphur gives a certain amount of acidity to the oxide, and it is considered by some that this type does not react with the proteins present in the rubber, whereas the neutral and alkaline type does react, and on this account the former extrudes and calenders smoothly. Alkaline accelerators will be affected, of course, by acid-type zinc oxide and if quantities of the latter are used in such mixings the excess acidity should be neutralised, *e.g.*, with lime.

Zinc oxides are liable to contain litharge as an impurity, and this must not exceed 0.1 per cent. if the oxide is to be used in light, or light coloured products. Oxides containing more than this, up to one per cent. of litharge, are quite suitable for reinforcing or accelerator activation, however, provided colour is of no importance.

Examination

Examination of zinc oxides should show a grit content (on the Porritt-Gallie apparatus) of under 0.05 per cent. on the 200 mesh sieve, while the moisture content should not exceed 0.5 per cent. The water-soluble matter should not be greater than 0.25 per cent., and there should be no cadmium or chloride present. As indicated above the allowable lead content can vary according to the purpose for which the zinc oxide is to be used.

The reinforcing action of zinc oxides cannot be entirely attributed to the particle size, since lithopone has a smaller particle size, but exerts only slight reinforcing action. In fact, a zinc oxide with a smaller particle size than standard grades enjoyed popularity for a time, but was shown subsequently to be in no way superior to the latter. Heating the oxide to 700° C., however, materially increases particle size, and reduces the reinforcing action. Zinc oxide particles approximate in shape to spheres, but acicular zinc oxide can be produced, and is used in the paint industry to reduce cracking.

Even in small quantities zinc oxide has a toughening action on rubber, and despite its high cost on a volume basis it has not been displaced from many types of mechanical rubbers. Nevertheless, it is its use as an activator for the generally used organic accelerators of vulcanisation which accounts for the greater part of the demand for the zinc oxide. To a minor extent it is used for rubbers liable to generate heat in service as it is a better conductor of heat than other pigments. Mixings containing a reasonable percentage of zinc oxide, for example, those used for solid tyring, keep cool and do not disintegrate.

An interesting new use for zinc oxide, which will grow in importance, is as an essential vulcanising agent for synthetic rubbers, such as Neoprene. With the latter, zinc oxide is analogous to the organic accelerator and sulphur in natural rubber, and it is important to remember that the zinc oxide behaves similarly to a fast accelerator, so that a mix containing it requires equal care to prevent scorching troubles in the factory. Magnesia is used as a retarding agent, or anti-scorching agent, in these mixings.

Lithopone

This white pigment is prepared by the precipitation of barytes and zinc sulphide together by the action of a solution of zinc sulphate on barium sulphide solution. Essentially lithopone contains 70 per cent. barium sulphate and 30 per cent. of zinc sulphide, and as prepared by precipitation is a coarse grained harsh substance, light grey in colour. After heating to a dull red heat, however, and plunging into water, grinding, washing, and then drying again, a very satisfactory and durable pigment is obtained. While the basis of manufacture is similar in all cases, actual processes vary considerably, but it is considered that success is largely dependent upon the use of pure materials. In some cases zinc chloride is used as a precipitate, and by this means the proportion of barium sulphate to zinc sulphide can be regulated according to the grade of product required.

Lithopone is a good white pigment with tinctorial power equal to that of zinc oxide, but with superior covering power. It has a very fine texture, although having little reinforcing effect on rubber compounds compared with zinc oxide it does not give such creamy or yellowish shades to rubber and since it is approximately 20 per cent. lighter in gravity, its advantages where colour is the principal consideration are obvious. In extruding compounds lithopone gives soft, smooth-surfaced products, and it is consequently largely used in such mixings.

Some lithopones have a tendency to darken in sunlight, a white mixing containing them turning discoloured after a short exposure, and tests have been suggested to pick out those likely to be defective by the use of the ultra-violet-ray lamp. It should be noted that mixings which have darkened in this way recover after a period in the dark. Standard lithopone is not the only grade available, and grades with high tinting power are available; there are also special lithopones, such as zinc barytes, and coloured types, such as cadmium lithopone, available. Where colour is not important, and only the physical properties of the lithopone are needed a cheaper grade known as "off-colour" is regularly sold.

Examination

The examination of lithopone includes moisture content, which should not exceed 0.2 per cent.; water-soluble matter, which should not be greater than 0.5 per cent.; barium sulphate, which should not be over 71 per cent.; fineness, in which test 99.9 per cent. should pass the 200 mesh sieve in the wet test; and covering power. In determining the latter it is essential to use a standard black pigment, a definite amount of the latter being mixed with a definite amount of the lithopone under test; a refined linseed oil is used as

vehicle, and the colour obtained compared with a known standard. Some users in the rubber trade prefer to rely on comparisons of cured rubber samples for colour, considering that if satisfactory on this test no colour troubles can arise. Except for white goods, the actual shade of a lithopone is not of great importance since its effect on the shade of colours for which it forms a background is negligible.

Titanium White

The source of this pigment is the mineral Ilmenite, which contains approximately 47 per cent. of iron protoxide and 53 per cent. of titanium oxide; treatment with sulphuric acid dissolves out the latter, and from the solution the oxide can be precipitated in colloidal form. The oxide is carefully washed, and then calcined at high temperature. Commercial titanium white can be obtained containing varying percentages of the oxide, usually 25 or 30 per cent., the remainder being barium sulphate or calcium sulphate. The former is prepared by suspending blanc fixe with titanium sulphate solution and precipitating the titanium dioxide. The pigment thus produced is not a simple mechanical mixture, but a physical one, possessing a uniform size of particle; possibly absorption of the colloidal titanium compounds takes place by the amorphous barium sulphate. In addition to the above the pure oxide, specific gravity 3.88, is sold, and is the strongest white pigment known; the price of the oxide has been reduced considerably in recent years and its use has consequently increased. Usually a trace of ultramarine blue is desirable in the mixing to give a good white.

Where a good white colour is required with a minimum of loading the use of titanium dioxide is essential, and in such products as thin white sheeting for aprons, etc., where it is necessary to calender the rubber to a very fine gauge while retaining a dense white colour, this pigment is largely used. The comparative hiding power of titanium dioxide compared with lithopone and zinc oxide, determined by the Pfund cryptometer, is given below:—

Titanium dioxide (98 per cent.)	118
Lithopone	54
Lead-free zinc oxide	40-49

The figures express hiding power in sq. cms. of surface per one gramme of pigment. Titanium dioxide is quite inert in rubber compounding and does not interfere in any way with the vulcanisation process; since it is not used for any purpose other than that of colouring, it is not usually present in sufficiently large quantities to affect the physical properties of the mix. On the other hand the titanium whites are used in much larger quantities, being of lower tinting power, and they have a softening effect on rubber containing them.

Institute of Chemistry

Pass List for September Examinations

THE Institute of Chemistry has announced the following pass list for the examinations which were held in September:—

Examination in general chemistry for the Associateship: John Stuart Blackburn, George Davies, B.Sc. (Lond.), A.R.C.S., Harry Charles Guthrie, Miss Catherine Mayne, B.Sc. (Liv.), Raymond John Michael Pollitt, B.Sc. (Lond.), Rupert Eardley Robinson, A.M.C.T., James Shanks, Edward Thomas Terry, John Martin Joseph Wadia, Charles Edward Waterhouse, Ph.C., Alexander Gilbert Williams.

Examinations for the Fellowship: Branch E (chemistry, including microscopy of food and drugs, and of water): Edward Collins, B.A., (Cantab.), William Robert Dracass, M.Sc. (Lond.), Frederick Ellington, B.Sc. (Lond.), A.R.C.S., Frank Foster, B.Sc. (Leeds), Reginald Ernest Hedger, B.Sc. (Lond.), George Vaughton James, M.Sc. (Lond.), Walter Lee, Alexander Loudon, B.Sc. (Witwatersrand), Leo McGraghan, M.Sc. (Lond.), Eric Charles Clifford Wood, B.Sc. (Lond.), A.R.C.S. Branch F (agricultural chemistry): Jack Hubert Hamence, Ph.D. (Lond), F.I.C.

Clay Suspensions

Dewatering by Submerged Combustion

THE possibility of dewatering clay suspensions by submerged combustion evaporation has been investigated by Kofe, Wilson, and Sheehy (*Amer. Ceram. Soc.*, 1937, *20*, 348-352).

Submerged combustion, in which the burning of the fuel-air mixture is carried out in a chamber entirely surrounded with the liquid to be heated, and the products of the combustion also pass through the liquid, so that the efficiency of heat transfer is very high, was carried out with city gas—air mixtures. When evaporating thin clay slips by this method, no trouble was experienced until the water content was reduced to 55 per cent., the viscosity of the mixture not being high enough to prevent agitation by the gas bubbles. Up to this point, the thermal efficiency was 96 per cent.

Dewatering could be carried on to 35 per cent. water content, provided care was exercised to avoid local over-heating, which could occur as the agitation by gas bubbles was not sufficient to distribute the heat uniformly.

Calcium Carbide Manufacture

Government Inquiry not to be Published

OWING to the fact that official technical and commercial secrets are involved, the report of the committee appointed by the Government to consider schemes for the manufacture of calcium carbide in this country may not be published as a White Paper, as was originally intended.

The erection and location of the carbide plants would be based on strategic as well as commercial factors, as a result of which the matter came within the scope of the Committee of Imperial Defence. Three main schemes were proposed—harnessing water power in the Scottish Highlands, using low-grade fuel in South Wales, or utilising surplus coke oven gas in the West of Scotland. The first two schemes were sponsored by the British Oxygen Co., Ltd., and the last by Campbell Binnie Reid and Co., engineers, of Hamilton, Lanarkshire.

The first two schemes are officially favoured, the one based on using excess coke oven gas being more uncertain. It is understood, however, that discussions are still in progress between the sponsors of the coke oven gas plan and Government representatives. The water power scheme in the Highlands, at Lochaber, near Fort William, would necessitate legislation to acquire land and water rights.

Soap Patents Claim

Petition Fails in U.S. Supreme Court

LEVER BROTHERS failed, on October 18, in a petition to the Supreme Court of the United States for a review of a decision against them in an infringement suit for which damages equal to £1,000,000 were originally claimed.

The decision against which Lever Brother petitioned was made by the seventh Circuit Court of Appeals, which held Levers liable for the infringement of the patents held by the Colgate-Palmolive-Peet Co., and the Proctor and Gamble Co. The Circuit Court had ruled that Lever Brothers' granulated soap—"Rinso"—was made according to the specifications patented by the two other firms mentioned. This ruling reversed the decision of the Federal District Court of Indiana, where the judge held that the Lever process was a reasonable improvement on the patents and no infringement. The Circuit Court ordered an accounting to determine the damages.

Coal: The Next Step

Sir Philip Dawson's Plea for Co-ordination of the Fuel Industries

IN his second presidential address to the Institute of Fuel, in London, on October 14, Sir Philip Dawson, M.P., dealt with the whole problem of British fuel resources on the broadest possible lines, namely, on what has been done, what was being done, and what could be done, for utilising in the fullest possible measure, what has been and still is to-day, the greatest source of our national wealth and also the foundation upon which our industrial life has been built.

During the last century coal utilisation was effected in three ways, of which by far the largest was that of burning it in the raw state. The gas industry consumed a fairly large proportion for the manufacture of gas; and, in the latter half of the century, uses were found for the by-products, tar and coke. Coal used for the production of metallurgical coke was manufactured in beehive ovens; and, although the gas produced was used for generating the heat necessary for carbonisation, no major by-products were marketed. The coal industry was prosperous, and such uneasiness as was from time to time displayed by the public and other interested parties was with reference to the time during which the supplies would last. A Royal Commission reported in 1871 that the coal resources were sufficient to last for 1,273 years; but this estimate could not, of course, include coalfields not then discovered, as, for instance, those in Kent. The question next engaged the attention of the Government in 1905, when the second Royal Commission agreed in general with the previous estimates, and also expressed the view "That there seems no present necessity to restrict artificially the export of coal, in order to conserve it for our home supply." As a result the Coal Export Tax of 1s. per ton, which had been levied on exported coal since 1901, was repealed in 1906.

Sir Philip Dawson, M.P.

The next major inquiry concerning fuel resources was undertaken by the Coal Conservation Committee, 1916-18, which was appointed under the Reconstruction Committee and arose out of the necessity for solving certain problems brought about by the war.

A commission under the chairmanship of Sir Herbert Samuel was appointed in 1926, "to inquire into and report upon the economic position of the coal industry and the conditions affecting it, and to make any recommendations for the improvement thereof." This inquiry was undoubtedly the most comprehensive one that has ever been undertaken into coal, including as it did the economics of the whole industry, and also such questions as utilisation and research. Consideration was given to the most important features of the current practice, and steps were recommended which, in the opinion of the commission, might promote the use of more scientific and more efficient methods of utilisation.

Progress Since 1926

It will be seen, therefore, that the last 30 years may be divided into three decades, each preceded by a Government inquiry into the problems—1905, 1917 and reconstruction, and 1926 respectively. Ten years have again elapsed, and it would be instructive to take stock once more, to consider what progress has been made since 1926 in the light of the recommendations of the Samuel Commission, and new developments and inventions which have been evolved since that time.

In common with every other branch of the industry, the end of the war marked the beginning of a period of rapid progress in the coking industry. Simultaneously with the growth and the development of the coking industry's principal business, coke, great strides have been made in the production and disposal of surplus gas. For the present the problem of finding a profitable outlet for the surplus gas remains, but there are two alternative means of disposal, namely, (1) as fuel for private and industrial consumers, and (2) as raw material for the chemical industries.

Surplus Gas for the Chemical Industry

The production of synthetic ammonia from coke-oven gas has not been profitable for a long time, and several of the plants erected in conjunction with the coke ovens in Belgium, France and Germany have been shut down or are operated on reduced output. There is no reason, however, why a coke-oven plant should not operate successfully in conjunction with plants producing synthetic motor spirit; indeed, the production of the gases by a combination of the carbonising and water-gas processes constitutes the best proposition.

This applies both to the hydrogenation of coal under pressure (Bergius) and to the synthesis of petrol and oils from carbon monoxide and hydrogen (Fischer process). It can be shown that in the case of the Bergius process the minimum consumption of fuel, and hence the lowest cost of hydrogen production, is obtained from a combination of carbonisation of coal and the gasification of the solid residue. This applies particularly when a useful outlet exists for the constituents of the gases initially produced, other than hydrogen. In the case of the Fischer-Tropsch process, it is not only more economical, but essential to add hydrogen obtained from other sources to the water-gas, in order to produce a synthetic gas of correct composition. The obvious and cheapest source for this additional hydrogen is the gas produced by the carbonisation of coal.

Enterprise and foresight on the part of the coal industry could have secured control of these processes in this country, which have now passed into the hands of the chemical industry. Although possibly more experienced in the handling of this type of chemical process, it is for economic reasons less well fitted to undertake the production of oil from coal.

German Hydrogen Supply Arrangement

As regards oil from coal by the Fischer-Tropsch process, it is worthy of mention that, in the first commercial unit in Germany, the hydrogen required was obtained by fractionation from coke-oven gas supplied by a neighbouring iron and steel works, the gas, after hydrogen removal, being returned to the steelworks for use in metallurgical furnaces. This is an admirable arrangement, as hydrogen has distinct disadvantages as a fuel for metallurgical purposes. In the first place, the water vapour formed on combustion is highly oxidising and leads to larger metallic heating losses; and secondly, the latent heat of the water cannot be recovered, so that the furnace efficiency obtainable is lower than when a fuel is used containing a low hydrogen content.

The question of home sources of oil, continued Sir Philip Dawson, first received serious attention in 1912, when the late Lord Fisher presided over a committee on fuel and engines for the navy, special consideration being given to the im-

plications involved if navy fuel, at that time entirely coal, were changed to oil. The advantages of the latter form of fuel for naval purposes were found to be so great that its grave disadvantage, of having to be entirely imported, was considerably outweighed. As a result, and expedited greatly by the war, the navy is now entirely dependent on fuel oil.

In order to get over the difficulty of petroleum not being an indigenous product, the Fisher Committee called attention to the possibility of a home supply being provided by subjecting coal used for industrial and domestic purposes to pre-treatment by some process of carbonisation, so as to render available supplies of fuel oil and a type of coke which, possessing as it does many of the advantages of raw coal, could be substituted for the latter, particularly in the domestic open fire. At that time the most promising method appeared to be low temperature carbonisation, which, of course, had not then become a commercial proposition. Since the war a new aspect of our fuel requirements has arisen in the necessity for providing motor spirit for air and land transport. Owing to this and the largely increased requirements for fuel oil, it soon became apparent that the suggestions of the Fisher Commission, even if they materialised in full, could not provide anything more than a fraction of our needs, even of fuel oil, and could not begin to satisfy our requirements of spirit for aviation in a time of national crisis.

Hydrogenation of Coal

At the time of the Samuel Commission the hydrogenation of coal, in order to transform a considerable proportion of its solid substance into liquid fuels, had been developed in Germany on the pilot plant scale. The British Government, through the Department of Scientific and Industrial Research, were following the matter closely, and were co-operating both financially and technically in the German experimental work of Dr. Bergius. An agreement had been effected by means of which the process was being investigated with regard to its applicability to British coals; and these experiments were controlled by a committee upon which there were two technical representatives of the British Government.

In 1928 it was proved definitely that about 60 per cent. of the pure coal substance could be converted into a crude liquid somewhat analogous to crude petroleum, from which a range of heavy, intermediate and light oils could be obtained by fractionation. Further work in this country, conducted independently by the Fuel Research Board and by Imperial Chemical Industries, Ltd., brought out the fact that the heavy and intermediate oils could be re-hydrogenated to produce further motor spirit; and about 1930 Imperial Chemical Industries announced that they could obtain a total yield of about 160 gallons of motor spirit per ton of suitable coal; but that the cost would be about 10d. per gallon.

Government Protection

Since refined spirit was being imported at about 3d. per gallon, it was evident that the process of hydrogenation of coal could not compete with imported petrol, unless some degree of protection were granted by the Government. This help was finally afforded in 1933, when it was announced that spirit produced from indigenous materials would be granted a preference in duty to the extent of 4d. per gallon for a period of 10 years; but that if in fact the actual preference amounted in any period to more than this, the time of 10 years would be reduced proportionately. Since this arrangement came into force, the actual preference has amounted to 8d. per gallon; so that the time of 10 years during which the guarantee remains in force has been substantially reduced. This guarantee encouraged Imperial Chemical Industries, Ltd., to proceed with their large-scale hydrogenation plant at Billingham.

It will be seen that a process such as this differs from low temperature carbonisation in that the motor spirit is the main product, whereas in the latter oils are merely by-products. In low temperature carbonisation the smokeless fuel is the main product; and, in a sense, the raw material is merely diverted from being directly burned to being pre-treated before burning. Little or no additional coal would be raised, even if the industry developed to an extent enormously greater than it has done up to now; and the spirit and oil produced would be an infinitesimal amount in comparison with the nation's requirements. On the other hand, hydrogenation consumes coal which would not otherwise have been raised, and the possibilities of producing motor spirit are theoretically without limit. Such a process is consequently an attractive one to those who are desirous of relieving unemployment in the mining industry, and considerable attention has been given to it from this aspect alone. The startling developments in the hydrogenation process afford a useful example of what can be done by an organisation which is in a position to view the whole problem nationally, and is not bound to consider the money-making aspect to the exclusion of everything else.

Coal or coke can be broken down into carbon monoxide and hydrogen. These gases are then recombined, either with or without additional hydrogen, in the presence of suitable catalysts, to form alcohols and light hydrocarbons of various types. Such processes are in use on a fairly large scale, and the bulk of the alcohols required for solvent purposes is produced in this manner. Developments have taken place abroad for fuel purposes, and large installations using the Fischer-Tropsch process are working in Germany. This process is independent of the fuel as raw material, and the gas for synthesis can be made from coal, semi-coke, gas-coke, coke-oven coke, or blast-furnace gas. The motor spirit so far obtained has, however, a low octane number.

Considerable interest is being taken at the present time in the combination of a synthetic process with one of the more normal processes. In conjunction with low temperature carbonisation, small unsaleable coke could be gasified and treated in this manner. If a satisfactory water gas producer could be developed which could operate with really fine coke breeze as raw material, such coke could be manufactured much more cheaply than the normal domestic semi-coke, and there is a possibility that such a combination might pay. Considerable large-scale experimental work would, however, be necessary before it would be possible to launch out into really adequate industrial installations.

Low Temperature Carbonisation

The time of the Samuel inquiry coincided with a wave of optimistic propaganda on the merits of low temperature carbonisation as a universal panacea for the ills of the coal industry. The Commission, however, reported that " they could find no evidence that the system has yet been anywhere established on a commercial scale for a period sufficiently long to enable the claims that are made on its behalf to be fully tested." They pointed out that the difficulties were not insuperable technically, and they said that " the evidence that we have taken has given us the impression that we may be within measurable distance of a solution of both the technical and commercial problems that arise." They also pointed out that one way in which the State could help these developments would be to offer an assured market for the coke and oils. As a result of this the Government became a customer for low temperature products as and when they became available. At the present time there are several plants in existence which are paying, and others are in course of erection or contemplated.

The Commission envisaged a time when something more drastic could be done to encourage the use of smokeless fuel. " Possibly if successful results were obtained on a large scale, the substitution of carbonised coal for raw coal would proceed with rapidity and without need of special stimulus. If it were found, however, that through reluctance on the part of the public to modify old methods, the smoke-producing coal, although not appreciably cheaper than the other fuel, was still used in considerable quantities, the Government and Parliament would doubtless consider whether its disuse could be accelerated. This might conceivably be done either by prohibition or by imposing a special tax upon a commodity, the

continued use of which would be, in the circumstances supposed, unnecessary as well as to the public detriment. This, however, is dealing with a hypothetical case, and, the antecedent conditions not yet having been realised, we abstain from making any definite recommendation."

Has not the time now arrived for reopening this question, asked Sir Philip Dawson? The loss from damage due to smoke is enormous. If a householder lives on the banks of the Thames, he is heavily fined if he discharges to the river material even so innocuous as lawn cuttings; but at the same time he can discharge any amount of gaseous effluent to the atmosphere with impunity.

Policy is the antithesis of improvisation; but even so the goals of a coal policy may be different. They may be grouped under the following headings:—(1) Conservation of coal resources; (2) cheapening, facilitating and, therefore, widening the use of coal; (3) developing coal as a raw material for oil and chemical products. The second item has been left to the joint efforts of coal producers, distributors, appliance makers and coal consumers; great progress has been made during the last 25 years, resulting in an enormous increase of efficiency and simultaneously increasing the resource value of our coal deposits. The first item affects the various countries differently according to whether they are rich or poor in coal deposits. Great Britain is fortunate to be amongst the former; and a comparison with the fuel policies of other great countries in the same category, namely, Germany and the United States, is instructive. Such a comparison shows that the national coal policy of those countries is at present governed by the availability of their respective natural resources of oil, gas and water power.

Germany raises about 450,000 tons of petroleum from her oil wells per year, corresponding to about 10 per cent. of her requirements, and 15 per cent. of her power consumption is covered by hydro-electric stations. She shares no overseas oil resources, is short of foreign currency, and her communications for the supply of oil from abroad would be endangered in case of war. German fuel policy is, therefore, entirely dictated by a national endeavour to use coal wherever it can economically be employed, and to establish an oil from coal industry to produce all the oil she may require, either by the low temperature carbonisation of brown coal, the hydrogenation of low temperature tar, brown or bituminous coal, the synthesis of gas derived from coal, or by solvent extraction.

There is no doubt that within another three years Germany will cover her entire demands of motor spirit and gas oil from home-produced materials, and the synthetic production of lubricating oil is likewise making headway. Some of the new installations are most interesting combinations of low or high temperature carbonisation and hydrogenation or synthesis plants.

In the United States the future development of coal depends in large measure on the extent of the supply of petroleum, natural gas and water power. Since 1913 the energy derived from these sources has practically been quadrupled, whilst the coal-produced power declined to 75 per cent. Present coal research is, therefore, mainly directed towards further economy and convenience in utilisation; but, since the proven petroleum reserves are estimated to last for a much shorter period than the coal deposits, it is obvious that within a comparatively few years coal will not only recover its place as the main source of power and heat, but also must become the raw material for the production of liquid and gaseous fuels.

Different as they may appear at the first glance, the fuel policies of the great industrial countries will eventually have to follow the same general lines, namely: (1) preparation for the production of oil from coal; and (2) co-ordination of the use of coal and oil.

Coal being the British nation's greatest indigenous asset, steps should at once be taken to ensure the Government being in a position to direct to a great extent a national policy on coal utilisation from the point of view of national economy. A step in this direction has been made by Government assistance in South Wales for the installation of low temperature plants. Linked up with plants built for carbonisation of these coals should be central installations for treating the by-products. Based on the country's requirements of the chemical products obtainable, a comprehensive production plan should be worked out, so that a situation is not developed which would cause over-production of any one commodity and lead to depressed markets, such as have existed for many years in the pitch industry. Utilisation of by-products should be considered in conjunction with the production of motor fuels by such processes as hydrogenation and liquid fuel synthesis from coal. These are objectives to aim at; but it is realised, of course, that such schemes will have to come gradually. They will, however, never come unless a definite programme is established with the firm intention of achieving these aims at the earliest possible time.

Chemicals Made in Canada

Additions and Deletions

A MEMORANDUM (Series D, No. 51, M.C.R. 15), dated August 16, 1937, issued by the Dominion Department of National Revenue, contains a revised list of chemicals made in Canada for the purposes of the administration of Tariff Items 216 and 218t. Additions include acid linseed oil (fatty), acetylene, ammonium phosphate (monobasic U.S.P.), ammonium phosphate (dibasic N.F. granular), calcium formate, calcium iodide, cresol (meta), cresol (ortho), cresol (para), cresol (U.S.P. and B.P.), gold sodium cyanide, hydrogen, magnesium hydroxide powder, manganese iodide, nitrogen, potassium bichromate (C.P. and A.R.), potassium tartrate neutral, sodium aluminate (liquid), sodium acid pyrophosphate, strychnine alkaloid, strychnine sulphate, strychnine bisulphate, zinc dimethyldithiocarbamate (zimate). Deletions include bismuth hydroxide (all grades), copper carbonate, chromium acetate, diacetyl, nickel carbonate, ortho-cresol. The wording of other items has been amended to read as follows:—

Ammonium acetate solutions (all grades), bismuth and ammonium citrate solutions, iodine resublimed (B.P., U.S.P., C.P. and A.R.), iron chloride solutions (B.P. and U.S.P.), sodium carbonate (reagent anhydrous and pure dried powder), sodium lactate solutions (all grades).

Hydration of Cellulose

Water Uptake of Different Mortifications Constant

THE hydration of cellulose derived from various sources has been studied by Tankard (*J. Text. Inst.*, 1937, *28*, T263-292). The amount of water taken up by the samples was determined by soaking them in water containing a neutral reference substance—sodium thiosulphate. After soaking, the samples were removed, adherent solution expelled in a screw press, and the increase in concentration of the thiosulphate determined.

The results showed that, contrary to many statements in the literature, the water uptake of the different kinds of cellulose is constant, and corresponds to definite molecular ratios of water to cellulose, from which it is inferred that in each case one, and only one, definite hydrate is formed. Thus the hydrate of bleached linen cotton cellulose contains 0.5 molecule of water per $C_{12}H_{10}O_5$ unit, that of dried mercerised cotton cellulose, 0.75, and of mercerised linen cellulose and regenerated viscose, 1.0.

The theory that the points of attachment of this water in the cellulose molecule are at the OH groups, is rendered somewhat doubtful by the observation that the hydration of cellulose tri-acetate and monomethylene ether, in which these groups are blocked, was 3.0 molecules per hexose unit, considerably higher than for ordinary cellulose.

New Technical Books

THE FINE STRUCTURE OF MATTER. Part I. X-Rays and the Structure of Matter. By C. H. Douglas Clark. Pp. 216. London: Chapman and Hall, Ltd. 15s.

Modern physics has allowed powerful weapons to be used for revealing the fine structure of matter. Prominent amongst experimental means which have proved themselves especially efficient are X-Rays, the dielectric cell, and the spectroscope. This book is devoted to a discussion of crystal and related structures as determined by X-rays. Space is economised by reference to the valuable "Strukturbericht" (1931) prepared by Ewald and Hermann, in connection with the *Zeitschrift für Kristallographie*. In the final chapter on the relation between crystal structure and chemical constitution, the author gratefully acknowledges the assistance he received from the fruitful discussion held under the auspices of the Faraday Society in 1929. The Debye theory of polarisation, Fajans' theory of deformation and the derivation and meaning of dipole moments will form the leading themes of Part II, which is in the press. Discussion of the results of spectroscopy will be commenced in Part III, with special reference to newer adaptations of the quantum theory in relation to line spectra. The preparation of a work of the present kind by one individual must necessarily be spread over a considerable period of time, and it was deemed preferable to bring the whole volume up to a certain date rather than to add to portions (written at later times) work done after the date. The book is designed to cover the period up to that surveyed by *Science Abstracts* (*Physics*), January, 1935.

A SHORT HISTORY OF CHEMISTRY. By J. R. Partington. Pp. 386. London: Macmillan and Co. 7s. 6d.

In this book Professor Partington, who is already well-known for his scholarly work "Origins and Development of Applied Chemistry" (1935), gives a concise survey of the history of chemistry up to recent days which have been notable for investigations into the structure of the atom. The greater part of the material has been drawn from original sources, and a bibliography of about 100 items is added to assist the reader in seeking further information. The period prior to the time of Robert Boyle has been treated briefly, but special prominence is given to Van Helmont, "who rejected the theory of the four elements and three principles as taught by Paracelsus," asserting that "the true elements were air and water." Developments during the latter part of the 19th century and the 20th century are merely illustrated by the work of a few outstanding chemists, because this period is invariably dealt with in detail in chemistry texts which have been prepared for the student. The biographical notes which are included are brief, but sufficient has been said to show the influence of the life of the person upon the investigations for which he or she has become notable. The book is well illustrated (mainly portraits) and each chapter is provided with a summary which gives just those facts which will usefully supplement any course of lectures upon chemistry.

PROTECTIVE FILMS ON METALS. By Ernest S. Hedges. Pp. 397. Second, Revised Edition. London: Chapman and Hall, Ltd. 21s.

During the five years that have elapsed since the publication of the first edition of this book, considerable progress has been made in the practical application of protective films on metals in accordance with the principles discussed. In revising the book, the aim has been not only to bring it up to date, but to increase its usefulness from the industrial viewpoint. The chapters on practical applications of oxide and similar films and on the modes of application and uses of metallic coatings have been very largely re-written. The chapter on oxide films in practice now contains an extended treatment of the anodic oxidation of aluminium and its alloys,

(*Continued in next column.*)

Treforest Trading Estate

Duke of Kent's Visit

(By our Special Correspondent)

THREE hundred happy workmen sang Welsh national songs in front of the Royal marquee when the Duke of Kent visited the Treforest Trading Estate, near Cardiff, on Wednesday. They had formed a "grand stand" with some of the lorries, excavators and caterpillar trucks which are being used in levelling and making roads through 300 acres of the Taff Valley. The estate is only three miles from Pontypridd and Caerphilly, so will draw its labour largely from the mining valleys, including the Rhondda, thus affording employment where most needed in South Wales. It is hoped that five thousand men and women will eventually work at Treforest.

Although work on the estate commenced only last Christmas, ten factories are already under construction, and negotiations for letting six more are in hand. The Duke of Kent inspected two factories in which production has started, both using processes new to Wales. At the works of Treforest Mouldings, Ltd., he was presented with some plastic toys made by a new method introduced from Germany, and he watched some ex-miners making steel mesh for concrete roads at the premises of Twisteel Reinforcement, Ltd. This firm began production at Treforest last June, under the supervision of a foreman from their factory at New Malden, and twenty-two workmen are already employed.

Four acres of ground on the estate have been reserved for Carbo-Ice Industries, Ltd., and a factory is in progress of erection. The initial plant, which will itself cover one-and-a-half acres, is to cost £65,000. Carbo ice and Carbo gas will be manufactured for the carbonisation of beer, cider and mineral waters, for gas storage and dispensing of ice cream, and for refrigeration of perishable commodities during transport by land and sea. It is hoped to start production early next year with fifty hands when it is estimated that the factory will use twenty tons of coal a day, large supplies of electricity, chemicals and cardboard containers. A large order has just been placed in Newport for steel cylinders for containing the gas.

The Trading Estate Company, which is financed by the Government, builds factories of 5,000 to 12,000 square feet, though sub-division down to 1,250 square feet can be arranged for small firms at rentals from £50 per annum. Steam laid on in pipes from the South Wales Power Co. is one of the many services offered. When the present factories are complete, paper-board, chemicals, steel products, switchgear, fancy goods, electrical batteries, typewriter ribbons, printing, book-binding, and chrome leather will be among the trades operating in this new centre of industry in South Wales.

(*Continued from previous column.*)

and discussions of similar electro-chemical and chemical treatments for magnesium, zinc, and tin. A feature of the revised chapter on hot-dipped coatings is an account of tin-plate manufacture and the hot-tinning of steel, copper, and cast iron; the properties of tin coatings, especially as regards thickness and porosity, are discussed in detail. Recent work on the structure of these coatings is reviewed, while their corrosion resistance is discussed particularly in its bearing on the canning industry. The chapter on electroplating has been lengthened very considerably, especially with regard to information on the structure, adhesion, properties of the coatings, and routine tests of their thickness and continuity. Sections on the electrodeposition of rhodium and of bronze have been added, while modern developments in electro-tinning are described in some detail. The new edition is designed to be useful both to the scientific reader and to the practical man in industries concerned with the corrosion, protection and decoration of metals in general, electroplating, tinning, galvanising, painting, lacquering, enamelling, etc.

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Personal Notes

MR. F. HARVEY, late of Dudley Gas Works, has been appointed technical assistant and chemist to the Loughborough Gas Undertaking.

MR. H. A. MCNAB, works manager of the British Oxygen Co., Ltd., Rotherham, addressed the Chesterfield Rotary Club, last week, on the uses to which liquid oxygen can be applied.

MR. J. H. LANE is succeeding Dr. C. Ainsworth Mitchell in the duties of secretary to the Society of Public Analysts and other Analytical Chemists, as from the commencement of November.

MR. R. L. M. SYNGE, B.A., of Trinity College Cambridge, has been awarded a Benn Levy studentship of one year's tenure for research in biochemistry. The studentship is valued at £100.

PROFESSOR CHARLES E. DODDS, who is professor of biochemistry in the University of London, has received a legacy of £1,000 under the will of Mr. John Waldy, a Darlington surgeon, " for kindness and help during illness."

DR. JOHN DEVINE has resigned from the post of demonstrator in physiological chemistry at Manchester University, on his appointment to a research post at Liverpool University. The new demonstrator in physiological chemistry is MR. HAROLD JACKSON, M.Sc. (Manchester).

SIR ROBERT ROBERTSON, D.Sc., F.R.S., treasurer of the Royal Institution, and lately Government chemist, has been appointed director of the Salters' Institute of Industrial Chemistry, in succession to Professor Arthur Smithells, D.Sc., F.R.S., who has resigned through ill-health.

MR. E. SAVILLE PECK, M.A., immediate past-president of the Pharmaceutical Society of Great Britain, and a member of the Council of the Society, has been chosen as Mayor of Cambridge for the ensuing Mayoral year, when the British Association for the Advancement of Science will hold its annual meeting at Cambridge.

MR. W. E. WAINWRIGHT, who for many years has given valuable service to the Standards Association and to the Council for Scientific and Industrial Research in Australia, has been awarded the medal of the Australian Institute of Mining and Metallurgy. This is the second occasion on which the Institute medal has been awarded.

MR. A. H. DAVIS, chairman of the Liverpool firm of paint manufacturers, A. H. Davis, Ltd., has completed fifty years in the paint trade. He is a past-chairman of the Liverpool and North-Western Paint Manufacturers' Association, and was president of the Paint, Colour and Varnish Manufacturers of the United Kingdom in 1929. During the war he was on the Admiralty Dazzle Paint Committee.

MR. R. M. BENNETT, whose father is a director of Tranmere Laundry, Birkenhead, has been awarded the Leverhulme Laundry Scholarship for 1937. He has been accepted at the University of Liverpool. The scholarship, which was instituted to assist study for the bachelor of science degree (with chemistry as a compulsory subject) at any approved British university, is awarded to relatives of members of the Institution of British Launderers, and is for three years and of the value of £120 a year.

PROFESSOR ARTHUR GEORGE PERKIN, D.Sc., F.R.S., of Grosvenor Lodge, Headingley, Leeds, emeritus professor of Leeds University and a pioneer in colour chemistry, left estate valued at £25,257, with net personalty £24,831. He bequeathed his property to his wife for life, and on her death one-fifth to the Chemical Society of London, desiring that it should be used to allay the expense of publishing their journal and four-fifths to Leeds University (for the benefit of the colour chemistry and dyeing department, for the purpose of creating scholarships, assisting necessitous students and providing museum specimens).

PROFESSOR E. C. C. BALY, accompanied by Mrs. Baly, will attend the jubilee meeting of the Indian Science Congress Association, in Calcutta, January, 1938.

MR. JOHN GARNETT, of Wilmer Field, Heaton, Bradford, chairman of Hopkinson and Shore, dyers, of Mirfield, left estate valued at £22,577, with net personalty £17,879.

MR. EDWARD WILLOUGHBY FIRTH, of the Highcliffe Hotel, Bournemouth, Hants, formerly a director of Thomas Firth and John Brown, Ltd., has left unsettled estate of the gross value of £98,384, with net personalty £97,474

MR. W. J. U. WOOLCOCK, representing Imperial Chemical Industries, Ltd., has been made a member of the Federation of British Industries' Committee on the Geographical Distribution of the Industrial Population.

PROFESSOR J. H. GADDUM has been appointed to the university chair of pharmacology tenable at the College of the Pharmaceutical Society of Great Britain. He has held a similar post at University College, London, since 1935.

SIR FREDERICK CROMBIE GARDINER, of Glasgow, who jointly with his brother, the late Mr. W. G. Gardiner, gave £60,000 to Glasgow University, in 1919, for the founding of professorships in chemistry, and who died on August 7, at the age of 82, has left personal estate in Great Britain valued at £542,551.

OBITUARY

MR. ROBERT ROBERTSON, for 43 years manager of Glen Mhor Distillery, Inverness, has died, at Inverness, after a short illness, in his 72nd year.

MR. ISAAC OLLIER, who for 50 years was foreman in the oil shed department at the soap works of William Gossage and Sons, has died at Widnes at the age of 82.

MR. DAVID VASS, who recently retired after serving for 25 years as manager of Perth Gas Department, has died at the age of 73. He was a member of the Society of Chemical Industry.

Foreign Chemical Notes

Norway

FOR THE 1936-37 TRADING YEAR, the Norsk Hydro announces a dividend of 8 per cent. on the preference shares and one of 4 per cent. on the ordinary shares.

Poland

THE NEW CELLULOSE FACTORY AT NIEDOMICE under government control has now commenced production with a daily output of 50 tons bleached sulphite cellulose. It is also intended to develop the production of cellulose for the synthetic textile industry.

Dutch Indies

THE ANNUAL OUTPUT OF TURPENTINE AND ROSIN in Northern Sumatra is 700 tons and 2,300 tons respectively; with the aid of a government subvention of 150,000 guilders it is hoped to increase these figures by 500 tons and 1,600 tons. A proportion of the turpentine is exported, but the whole of the rosin is absorbed by the native soap, paper and batik industries.

Italy

EXTENSIVE COPPER AND TUNGSTEN ORE DEPOSITS are at present being prospected at Bedovina, near Predazzo, by the Cogne Co. Situated in a mountainous region at a height of 5,000-7,000 feet, the deposits are estimated to contain 700,000 tons of ore. The upper strata contain about 1.5 per cent. copper and 0.8 per cent. tungsten, but a much richer concentration is anticipated in the lower strata (over 2 per cent. tungsten). The company plans to prepare copper sulphate and tungsten concentrates in the mining area.

From Week to Week

THE EARL OF ELGIN will light the kilns at Roscobie limeworks on November 2. These limeworks were recently taken over by the Charlestown Lime Co., Ltd.

T.M. THE KING AND QUEEN made a tour of one of the factories of Reckitt and Sons at Hull on Tuesday. Their majesties were received by Sir Philip Reckitt and shown the packing of products and the company's welfare department.

EXTENSIVE DAMAGE WAS CAUSED BY FIRE at the premises of the Brightside Plating Co., Brearley Street, Aston, on October 17. Considerable damage was done to the building and the contents, which included material ready for plating.

THE VALOR CO., LTD., will be exhibiting in the service and garage equipment section of the International Commercial Motor Transport Exhibition at Earls Court, November 4-13. They will show steel shelving for all purposes, and fire extinguishers.

MENU CARDS PRINTED IN NINE LANGUAGES have been dispatched to hotels in fourteen countries, to remind diners all over the world, in Arabia and in remote Colonial townships as well as in great capital cities, that the 1938 British Industries Fair will open in London and Birmingham on February 21, 1938.

COAL TAR BENZOL, when imported into Canada by refiners of crude petroleum for use only in blending with gasoline wholly produced in Canada, until December 31, 1937, will be duty free under the British preferential tariff, subject to a duty of 10 per cent. under the intermediate tariff, and 20 per cent. under the general tariff.

HEAT-RESISTING STEELS are discussed by Sir Robert Hadfield, F.R.S., in a recent publication of the Mond Nickel Co., Ltd. The author traces the development of these materials and describes a few steels characteristic of modern applications. The text matter forms a handy collation of information likely to prove of interest and use to engineers in many fields.

THE TECHNICAL SERVICE LIBRARY has been greatly enlarged since it was formed in 1930. The revised list contains many additions, more accurate cross indexing, and covers a wider range of subjects. This library is maintained to assist users of solvents, plasticisers and related products. It comprises books, articles, and memoranda from many sources which may be borrowed upon written application.

BRITISH ROAD EXPERTS and members of gas, coke-oven, and tar distilling interests will attend the annual general meeting of the British Road Tar Association in London on November 4. The meeting will be presided over by Sir David Milne-Watson. The new chairman of the association is Mr. J. Davidson Pratt, who succeeded Sir Reginald Clarry, M.P., last June. Practically the whole of the tar used for road purposes in this country is produced by the 850 members of the British Road Tar Association.

THE HOME SECRETARY has appointed a committee to inquire into the use of celluloid and any similar highly inflammable material in the manufacture of toys, fancy goods, articles of attire, toilet requisites and the like; and to consider what steps are desirable and practicable against the danger arising to the public, and especially to children, from such use. The members of the committee include Dr. J. J. Fox, government chemist, and Mr. E. I. Macklin, superintending inspector of factories.

REPRESENTATIVES OF TWELVE EUROPEAN COUNTRIES will arrive in England on October 25, to spend a week as the guests of Henry Wiggin and Co., Ltd., the well-known producers of nickel alloys. Discussions will stress particularly the place of nickel and its alloys in the chemical and allied industries. In this connection probable developments in the European markets will be primarily in the use of monel metal or nickel for phenolic resin equipment and for those applications in the textile and rayon industries where caustic recovery is an important essential.

NEW FORMS OF ELECTRIC LAMPS were demonstrated at the opening meeting of the Illuminating Engineering Society recently, on behalf of all members of the Electric Lamp Manufacturers' Association. The luminescent lamp consists essentially of a mercury electric discharge lamp in a bulb, the interior of which is coated with a fluorescent powder. As a result the high efficiency of 38 lumens per watt associated with the mercury electric discharge lamp is maintained, but with the advantage that the ultra-violet radiations are transformed by the fluorescent powder to bring about a remarkable change in colour.

NON-CORRODING STEELS, of the chromium-nickel austenitic type, offering remarkable resistance to many chemical agents, and at the same time possessing mechanical qualities which render them widely serviceable and capable of being worked into a great variety of forms, are the subject of a new brochure (No. 407) of Hadfields, Ltd. An important characteristic of "Era" steels, which distinguishes them from various non-ferrous metals and alloys, is that of complete resistance to nitric acid in all concentrations and temperatures. They are also unaffected by solutions such as those of ammonium nitrate, copper sulphate, mercuric chloride, picric acid or sulphurous acid, which are known to attack certain widely-used alloys of the non-ferrous class.

ABOUT 120,000 EMPLOYEES AT GASWORKS will benefit by a wage settlement which gives an increase of a halfpenny an hour to day workers and an increase of 4d. a shift to night workers.

COMPAGNIE COMMERCIALE DU NORD (GREAT BRITAIN), LTD., merchants in chemicals, colours and oils, report that they have recently been appointed agents for ground silica produced by a Belgian works. The silica is available in 100 to 250 mesh.

THE OPENING MEETING of the 1937-38 session of the Liverpool and North-Western Section of the Institute of Chemistry took place on October 14, when the chairman of the section, Mr. A. W. M. Wintle, gave an address on "Chemical Service Implications."

CAST IRON PIPES which had been in use for 150 years were exhibited by Mr. F. Woodhouse, F.I.C., chief chemist to the Stanton Ironworks Co., Ltd., when he delivered the chairman's address to the members of the Nottingham section of the Society of Chemical Industry, on October 15. He exhibited a film showing the manufacture of the spun iron pipe, which was first produced on a commercial scale 13 years ago.

A PROGRAMME FOR THE PURCHASE OF COTTON-SEED OIL, designed to strengthen cottonseed prices to farmers, is announced by the Agricultural Adjustment Administration of New York. Purchases will be made by the Federal Surplus Commodities Corporation, but prices and quantity have not yet been determined. Cottonseed crushings since August 1 to end September totalled 973,000 tons, compared with 179,000 tons at the end of August.

HENRY BRIGGS, SON AND CO., LTD., of Whitwood Collieries, Normanton, have increased their nominal capital by the addition of £94,250 in £1 ordinary shares beyond the registered capital of £655,750. The new shares have been created in connection with the company's recent acquisition of Newthorpe Lime Works, Micklefield, and all the issued shares of Ledston, Ltd., proprietors of Micklefield Colliery.

AN ADVANCE IN COAL PRODUCTION is announced by the United Steel Works (German Steel Trust) for the year ended September 30. The total amount produced was 25,898,000 tons, as compared with 22,320,000 in the previous year. Pig-iron output at 6,041,000 tons (compared with 6,037,000 tons) and coke output at 8,491,000 tons (against 7,932,000 tons) also show small advances. There was, however, a slight setback in the production of raw steel. The total amount produced was 6,281,000 tons, while the corresponding figure for last year was 6,398,000 tons.

ACCORDING TO THE BOARD OF TRADE RETURNS for the month ended September 30, 1937, imports of chemicals, drugs, dyes and colours were valued at £1,235,037, as compared with £1,190,251 for September, 1936, an increase of £44,786. Exports were valued at £2,046,380, as compared with £1,736,888, an increase of £309,492. Re-exports were £31,644. Notable increases are recorded for imports of boric acid (from £3,020 to £7,047), borax (from £8,592 to £17,704), medicinal oils (from £5,581 to £10,410), and carbon black from the United States (from £37,977 to £66,053). Imports of calcium carbide from foreign countries decreased from £49,105 to £43,292. Exports of citric acid increased from £8,355 to £14,271; ammonium sulphate from £96,853 to £152,947; bleaching powder from £14,261 to £19,944; caustic soda from £77,005 to £91,602.

THE RUST-PROOFING OF IRON AND STEEL by chemical treatment will be the subject of papers to be read at a meeting of the Yorkshire Section of the Society of Chemical Industry on October 26, in the Chemistry Lecture Theatre of the University of Leeds. Mr. J. E. Such, M.Sc., will describe the history and chemistry of rust-proofing by phosphates and the methods in commercial use in this country and abroad. He will give an account of the properties of phosphate coatings, with special reference to corrosion resistance and suitability as a base for subsequent painting or enamelling. Mr. Herbert Whitaker, M.Sc., will review the development of the patents of Bower and Barff. He will describe the essentials for successful application of the process and the classes of work for which it is suitable. Members of the Institute of Chemistry and of the Chemical Society are cordially invited.

PLANS FOR THE NEW HEADQUARTERS of the Pharmaceutical Society of Great Britain, to be built in Brunswick Square, London, at an estimated cost of about £200,000, have been approved by the London County Council, subject to minor alterations. The present building in Bloomsbury Square has long been inadequate to the needs of the society, whose membership, as a result of legislation, now includes virtually all qualified pharmacists in the country. Work on the new buildings will begin next year. Provision is to be made for facilities for research work in pharmacology and in the biological standardisation of drugs. Members of the staff have recently visited Germany, Denmark, Switzerland, Holland, Belgium, and other countries and inspected pharmaceutical colleges, laboratories, and institutes in order to examine methods which might be adopted with advantage in the new buildings. The lecture theatre in the new headquarters will be capable of accommodating 250 persons.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Applications for Patents

MANUFACTURE OF CALCIUM CYANAMIDE.—A.-G. für Stickstoffdunger. (Germany, Oct. 2, '36.) 26821.

IMMERSION-STERILISERS.—American Sundries Co. (United States, April 23.) 26947.

CORRECTIVE LENS SYSTEMS.—Bausch and Lomb Optical Co. (United States, Oct. 22, '36.) 26497.

CENTRIFUGAL PUMPS.—J. Beresford and Son, Ltd., and S. A. Smith. 26470.

PURIFICATION OF LIQUIDS.—D. Borton. 26899.

MANUFACTURE OF GLASS BOTTLES, ETC.—British Hartford-Fairmont Syndicate, Ltd. 27096.

MANUFACTURE OF TUBES of cellulosic material, etc.—A. Brosette. (Germany, Oct. 5, '36.) 27009.

PREPARATION OF CARBON-BLACK.—D. Bulgin, and F. B. Jones. 26708.

MANUFACTURE OF CELLULOSE DERIVATIVES.—Cellulose Holdings, Inc. (United States, Oct. 15, '36.) 26486.

MANUFACTURE OF PLASTIC LENSES, ETC.—Combined Optical Industries, Ltd., C. F. Smith, and W. E. Williams. 26661.

PRODUCTION OF HARD CEMENTED CARBIDE.—G. J. Comstock. 26570.

LIQUID-CIRCULATING MEANS FOR PASTEURISING-APPARATUS.—Creamery Package Manufacturing Co., Ltd., and A. H. Gabb. 26682.

STIMULATION OF PLANT-GROWTH.—Dow Chemical Co. (United States, Oct. 7, '36.) 26577.

STIMULATION OF PLANT-GROWTH.—Dow Chemical Co. (United States, Jan. 13.) 26578.

HIGH-PRESSURE METAL-VAPOUR ELECTRIC DISCHARGE DEVICES.—General Electric Co., Ltd. (Patent-Treuhand-Ges. für Elektrische Glühlampen). 26800.

TREATMENT OF ACID SLUDGE from mineral-oil and benzole refining.—W. Green, W. F. Carr, Manvers Main Collieries, Ltd., and T. G. Woolhouse. 26790.

FOAM-PRODUCING APPARATUS.—A. de B. Haughton. 26543.

MANUFACTURE OF PRODUCTS from amorphous quartz.—M. Hauser. (Germany, Oct. 6, '36.) 26992.

PRODUCTION OF CERAMIC PRODUCTS with a metallic character.—M. Hauser. (Germany, Oct. 6, '36.) 26993.

TREATMENT OF TEXTILES, ETC.—A. A. Houghton, and Imperial Chemical Industries, Ltd. 27005.

MANUFACTURE OF METAL POWDER for electrical, etc. purposes. I. G. Farbenindustrie. (Germany, Oct. 3, '36.) 26630.

MANUFACTURE OF NONACARBOCYANINE DYESTUFFS.—I. G. Farbenindustrie. (Germany, Oct. 29, '36.) 26824.

PHOTOGRAPHIC PAPERS.—I. G. Farbenindustrie. (Germany, Jan. 30, '36.) 26953.

MANUFACTURE OF CHLORINATED PRODUCTS.—Imperial Chemical Industries, Ltd., and F. W. Kirkbride. 26541.

MANUFACTURE OF INSECTICIDAL COMPOUNDS.—Imperial Chemical Industries, Ltd. (United States, Oct. 3, '36.) 26875.

COPPER-BASE ALLOYS.—Imperial Chemical Industries, Ltd. (American Brass Co.). 27004.

CONNECTORS FOR FLEXIBLE METALLIC TUBING.—F. Jackson. 27062.

AROMATIC OXY-KETONE ARSENICALS.—F. Jackson. (Parke, Davis and Co.). 26545.

PROTEIN PRODUCTS.—F. Jackson. 26546.

APPARATUS FOR DRAWING SEAMLESS TUBING.—F. Jackson (Wolverine Tube Co.). 26980.

RECOVERY OF PHENOLS from resins of phenols and aldehydes. G. W. Johnson (I. G. Farbenindustrie.) 26491.

MANUFACTURE OF OILY PRODUCTS from brown coals.—G. W. Johnson (I. G. Farbenindustrie.) 26803.

PROCESS FOR IMPROVING PULVERULENT FUELS, ETC.—G. W. Johnson (I. G. Farbenindustrie.) 26804.

MANUFACTURE OF EPICHLORHYDRIN.—G. W. Johnson (I. G. Farbenindustrie.) 26973.

PRODUCTION OF FAST DYEINGS.—G. W. Johnson (I. G. Farbenindustrie.) 26974.

MANUFACTURE OF FIBRO-CEMENT MATERIALS.—Laminoid Products, Ltd. 26830.

MANUFACTURE OF HYDROGEN PEROXIDE.—B. Laporte, Ltd. (France, Oct. 6, '36.) 27103.

PREPARATION OF CORROSION-RESISTING COATINGS.—C. F. Lumb. 26977.

MANUFACTURE OF RUBBER-LATEX SHEETS.—R. F. McKay (International Latex Processes, Ltd.). 26564.

VITREOUS ENAMELLED PRODUCTS.—Monsanto Chemical Co. (United States, Oct. 5, '36.) 26737.

MANUFACTURE OF STABLE MIXTURES containing laevo-ascorbic acid, etc.—Naamlooze Vennootschap Industrieele Maatschappij voorheen Noury and Van der Lande. (Holland, Oct. 1, '36.) 26531.

ALUMINIUM-BASE ALLOYS.—Northern Aluminium Co., Ltd., and G. H. A. Field. 27108.

PREPARATION OF PIGMENTS of the phthalocyanine series.—Montecatini Soc. Generale per l'Industria Mineraria ed Agricola. (Italy, July 3.) 26826.

MAGNETIC ALLOYS containing tungsten.—G. H. S. Price, and General Electric Co., Ltd. 26799.

PRODUCTION OF LUBRICATING-OILS.—Ruhrchemie, A.-G. (Germany, Oct. 1, '36.) 26644.

PRODUCTION OF LUBRICATING-OILS.—Ruhrchemie, A.-G. (Germany, Nov. 28, '36.) 26645.

STEEL-CASTING ALLOYS.—H. J. Schiffler. (Germany, Oct. 12, '36.) 26869.

MANUFACTURE OF COMPOSITIONS for removing stains.—L. C. Schilling. (Holland, Aug. 18.) 26845.

ELECTRODEPOSITION OF COPPER.—B. F. Schweib. 26776.

BERYLLIUM ALLOYS.—Seri Holding Soc. Anon. (Italy, June 30.) 26811.

MANUFACTURE OF COMPOUNDS of the thiazolidine series.—Soc. of Chemical Industry in Basle. (Switzerland, Oct. 2, '36.) 26617.

MANUFACTURE OF COMPOUNDS of the thiazolidine series.—Soc. of Chemical Industry in Basle. (Switzerland, Sept. 18.) 26618.

MANUFACTURE OF AZO-DYESTUFFS containing metal.—Soc. of Chemical Industry in Basle. (Switzerland, Oct. 3, '36.) 26822.

MANUFACTURE OF AZO-DYESTUFFS containing metal.—Soc. of Chemical Industry in Basle. (Switzerland, Oct. 3, '36.) (Cognate with 26822.) 26823.

PROCESS FOR ENSURING THE ADHESION OF COATING SUBSTANCES to foundation-surfaces.—Soc. pour l'Etude et l'Exploitation des Matières Luminescentes. (Austria, April 15.) 26862.

PROCESS OF GLUTAMIC ACID RECOVERY from solutions.—Standard Brands, Inc. (United States, Oct. 15, '36.) 26957.

GLUTAMIC ACID PRODUCTION.—Standard Brands, Inc. (United States, Oct. 15, '36.) 26958.

DESULPHURISATION OF GASOLINES.—Standard Oil Development Co. (United States, Dec. 23, '36.) 26870.

PREPARATION OF NITRATED DERIVATIVES of hydroformed naphthas, etc.—Standard Oil Development Co. (June 19, '36.) (United States, Oct. 16, '35.) 27132.

PREPARATION OF POLYBASIC ACID DERIVATIVES of hydroformed naphthas, etc.—Standard Oil Development Co. (United States, Oct. 16, '35.) 27133.

PREPARATION OF PHENOLIC DERIVATIVES of hydroformed naphthas etc.—Standard Oil Development Co. (June 19, '36.) (United States, Oct. 16, '35.) 27134.

PREPARATION OF BETA-OLEFINES.—A. H. Stevens (Phillips Petroleum Co.). (June 24, '36.) 26784.

TREATMENT OF OILED SILK, ETC.—C. P. Trustrum. 26663.

MANUFACTURE OF TEXTILE FIBRES.—R. Wallach, and F. H. Reichel. 26738.

CONTINUOUS REFINING OF VEGETABLE, ETC., OILS.—Aktiebolaget Separator. (Sweden, Oct. 8, '36.) 27363.

CHLORINATED ARALKYL KETONES.—Armour and Co. (United States, March 9.) 27204.

Specifications Open to Public Inspection

METHOD OF TANNING HIDES and skins.—Chemische Fabrik J. A. Benckiser Ges. March 31, 1936. 21532/36.

MANUFACTURE OF IMIDAZOLINES.—E. Waldmann, and A. Chwala. April 4, 1936. 21553/36.

METHODS OF PASTEURISATION.—Cherry-Burrell Corporation. April 1, 1936. 30809/36.

PRODUCTION OF HYDROCARBON produced by the treatment of hydrocarbon gases at high temperatures.—Standard Alcohol Co. March 31, 1936. 35701/36.

ADHESIVES.—Henkel and Cie, Ges. April 3, 1936. 1482/37.

PROCESS FOR THE PRODUCTION OF VALUABLE OXIDATION PRODUCTS from aliphatic hydrocarbons.—Henkel and Cie, Ges. March 31, 1936. 2341/37.

MANUFACTURE OF DISAZO-DYESTUFFS.—I. G. Farbenindustrie. March 31, 1936. 2662/37.

MANUFACTURE OF 1-CHLOROMETHYL-5-NITRONAPHTHALENE.—I. G. Farbenindustrie. April 3, 1936. 5025/37.

MANUFACTURE OF COMPOUNDS of dimethylxanthines.—I. Grossberg. March 30, 1936. 5297/37.

METHOD OF AND MEANS FOR PREVENTING CORROSION of metal parts in cooling or heating systems.—I. G. Farbenindustrie. March 31, 1936. 5602/37.

CLEANSING AGENT FOR LIGHT-METAL MELTS.—Metallochemische Fabrik, A.-G., and W. Claus. March 30, 1936. 5979/37.

PROCESS OF HYDROCARBON OIL CONVERSION.—Naamlooze Vennootschap Nieuwe Octrooi Maatschappij. April 1, 1936. 6834/37.

OBTENTION OF COAL EXTRACTS.—Gewerkschaft M. Stinnes. March 28, 1936. 7215/37.

FILLING OF REACTION CHAMBERS and towers.—Chemische Fabrik Curtius, A.-G. April 1, 1936. 7580/37.

PROCESS FOR PRODUCING GASOLINES of a high anti-knock value. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. March 30, 1936. 7888/37.

TREATMENT OF AMMONIACAL SOLUTIONS of metal salts.—I. G. Farbenindustrie. April 4, 1936. 7981/37.

MANUFACTURE OF ABSORPTIVE MATERIALS.—I. G. Farbenindustrie. April 2, 1936. 8136/37.

PROCESS FOR PRODUCING CATALYSTS for benzine synthesis.—Ruhrchemie, A.-G. April 1, 1936. 8143/37.

MANUFACTURE OF KETONES of the sterol series.—I. G. Farbenindustrie. March 28, 1936. 8657/37.

METALLISING SURFACES.—R. Bosch, A.-G. March 30, 1936. 8772/37.

MANUFACTURE OF β-HALOGEN-BUTADIENES-1, 3.—I. G. Farbenindustrie. March 28, 1936. 8820/37.

TREATMENT OF SYNTHETIC RESINS and materials containing same. L. Robin, and M. van Roggen. April 1, 1936. 8826/37.

PROCESS FOR THE MANUFACTURE OF α-β-UNSATURATED KETONES of the cyclopentano-polyhydrophenanthrene series.—Schering-Kahlbaum, A.-G. March 31, 1936. 8840/37.

PROCESS FOR THE MANUFACTURE OF β-α-UNSATURATED KETONES of the cyclopentano-polyhydrophenanthrene series.—Schering-Kahlbaum, A.-G. March 31, 1936. 8841/37.

MANUFACTURE OF KETONES and alcohols from olefines.—Usines de Melle, and H. M. E. Guinot. March 28, 1936. 8876/37.

MANUFACTURE OF CARBOXYLIC ACIDS of the hydroaromatic series. I. G. Farbenindustrie. March 28, 1936. 9032/37.

PROCESS FOR THE ELECTROTHERMIC PRODUCTION OF COMPACT METALLIC MAGNESIUM by reduction of oxidic magnesium compounds.—American Magnesium Metals Corporation. April 2, 1936. 9095/37.

PRESERVATION OF RUBBER.—Monsanto Chemical Co. April 3, 1936. 9096/37.

PROCESS OF AND FURNACE FOR HEATING FLUIDS.—Universal Oil Products Co. March 31, 1936. 9120/37.

PROCESS AND APPARATUS FOR MANUFACTURING ARTIFICIAL SILK from cuprammonium cellulose solutions by the funnel stretch spinning method.—J. P. Bemberg, A.-G. April 4, 1936. 9217/37.

PROCESS FOR THE PRODUCTION OF RUBBER-LIKE PRODUCTS.—Beck, Koller and Co. (England), Ltd. April 3, 1936. (Cognate Application, 9403/37.) 9402/37.

PRODUCTION OF ALUMINA and its derivatives.—Giulini Ges, Geb. April 2, 1936. 9469/37.

MANUFACTURE OF POLYMERIC PRODUCTS.—I. G. Farbenindustrie. April 3, 1936. 9521/37.

PREPARATION OF CELLULOSE ESTERS.—Kodak, Ltd. April 3, 1936. 9535/37.

MANUFACTURE OF AROMATIC NITRO- AND AMINO-COMPOUNDS.—I. G. Farbenindustrie. April 4, 1936. 9599/37.

HYDROLYSIS OF TITANIUM SALT SOLUTIONS.—British Titan Products Co., Ltd. April 4, 1936. 9660/37.

VULCANISATION OF RUBBER.—Wingfoot Corporation. April 8, 1936. 35816/36.

METHOD OF MANUFACTURE OF SMOKELESS POWDER.—Hercules Powder Co. April 7, 1936. 3513/37.

MANUFACTURE OF CHROMIUM-NICKEL ALLOY STEELS resistant to intercrystalline corrosion.—F. Bartscherer. April 11, 1936. 4235/37.

RESINOUS MATERIAL for use in moulding and method of preparing same.—Mead Corporation. April 9, 1936. 8155/37.

APPARATUS FOR DEODORISING and removing dust from gases from furnaces for calcining liquors containing combustion residues.—Raffinerie Tirlemontoise Soc. Anon. April 10, 1936. 8658/37.

CHROMIUM PLATING OF ALUMINIUM and aluminium alloys.—Dr. Finckh Ges. April 7, 1936. 9327/37.

MANUFACTURE OF ALKALI THIOCYANATES.—Rohm and Haas Co. April 9, 1936. 9565/37.

Specifications Accepted with Date of Application

MANUFACTURE OF KETENE.—E. I. du Pont de Nemours and Co., and C. H. Greenewalt. April 2, 1936. 472,988.

MANUFACTURE OF 2 : 4-DIMETHYL-3- (or -5-)-NITROBENZYLCHLORIDE. I. G. Farbenindustrie. April 4, 1935. 472,994.

ELECTRODEPOSITION OF ZINC.—Imperial Chemical Industries, Ltd. April 4, 1935. 472,995.

ELECTRODEPOSITION OF ZINC.—Imperial Chemical Industries, Ltd. April 4, 1935. 472,996.

TREATMENT OF CELLULOSE ESTERS and materials comprising the same.—British Celanese, Ltd. April 3, 1935. 473,004.

TREATMENT OF YARNS, filaments, fabrics, and like materials.—British Celanese, Ltd. April 3, 1935. 473,005.

MANUFACTURE OF COLOURED CONDENSATION PRODUCTS.—Soc. of Chemical Industry in Basle. April 5, 1935. 472,699.

PROCESS FOR MANUFACTURING VALUABLE PRODUCTS from hydrocarbon oils.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. April 15, 1935. 472,767.

MAGNESIUM ALLOYS containing cerium and other elements.—J. L. Haughton, and W. E. Prytherch. May 5, 1936. 472,771.

MANUFACTURE OF DYESTUFFS of the anthraquinone series.—Soc. of Chemical Industry in Basle. Jan. 10, 1936. 472,790.

MANUFACTURE AND USE OF PLASTIC MASSES, paints, lacquers, coatings, and the like, composed of aqueous dispersions of linoxyn.—Soc. Italiana Pirelli. Jan. 31, 1936. 472,738.

PROCESS FOR PURIFYING CAUSTIC-SODA LYES.—I. G. Farbenindustrie. July 23, 1936. 472,754.

SMOKELESS PROPELLANT POWDER and process of making the same. F. B. Dehn (Western Cartridge Co.). Jan. 2, 1936. 473,057.

PRODUCTION OF MATERIALS FOR USE IN PREPARING EMULSIONS for the treatment of textile materials.—M. Blancato. March 2, 1936. 473,126.

PRODUCTION OF ANTI-ANAEMIC PREPARATIONS.—B. D. Thornley. March 5, 1936. 473,064.

MOTOR FUELS.—Standard Oil Development Co. Oct. 23, 1935. 473,185.

PROCESS OF DYEING or colouring materials.—Soc. of Chemical Industry in Basle. April 5, 1935. 473,192.

MANUFACTURE OF PYRIMIDINE COMPOUNDS.—A. Carpmael (I. G. Farbenindustrie.) April 3, 1936. 473,193.

PRODUCTION OF LACQUERS, varnishes, coating, impregnating and adhesive agents.—Deutsche Hydrierwerke, A.-G. April 5, 1935. 473,329.

MANUFACTURE OF MOULDED OR SHAPED ARTICLES OF FABRIC.—I. G. Farbenindustrie. April 5, 1935. 473,142.

ELECTRIC BLASTING DETONATORS and the like.—L. Rubenstein, W. Taylor, and Imperial Chemical Industries, Ltd. April 6, 1936. 473,146.

Chemical and Allied Stocks and Shares

INDUSTRIAL and other shares have made further recovery from the heavy set-back shown in the early part of last week, but values generally are lower on balance. Unsettled conditions have continued, largely because of the further sharp reaction of New York markets. The decline in commodity and metal prices is also influencing sentiment, although this is generally believed to reflect indications of a slowing down of trade activity in the United States which in many quarters is viewed as only a temporary development.

Shares of companies identified with the chemical and associated trades have fluctuated rather closely with the day-to-day trend of the stock and share markets, but in various cases they show some improvement from the low prices made a week ago. Imperial Chemical, for instance, are 36s. 10½d. at the time of writing, compared with 35s. 9d. a week ago and United Molasses 27s. 3d., compared with 25s. 3d. Boots Pure Drug 5s. shares have improved 1s. 6d. to 49s. 9d., and continue to be regarded in many quarters as a first-class industrial investment. This is because of the high earning capacity of the business shown over a long period of years, the excellent dividends paid and the general strength of the financial position, which suggests the possibility of an eventual scrip bonus. It is not, however, generally expected that there is likely to be any question of an early distribution of a bonus, although it is believed in the market that the various subsidiary companies retain a good proportion of their profits and that the position of the group as a whole must be exceptionally strong. Sangers reacted at one time, but later recovered and at 23s. 7½d. are virtually unchanged on the week, the view having continued that there seem reasonable possibilities of the dividend being maintained at 25 per cent.

A good deal more attention was given to Imperial Smelting, which have moved up from 14s. 9d. to 16s., partly owing to the view that, as the directors invariably follow a conservative policy, it is possible the full results may show the dividend to be covered by a good margin of profits. It may be recalled that it was recently announced that dividends were to be resumed with a payment of 5 per cent. Associated Portland Cement and British Plaster Board were better, interim dividend estimates having tended to draw more attention to the last named. Unilever were weak. Following a recovery to 37s. a reaction to 35s. was shown which is virtually the same price as that ruling a week ago. The fluctuations in the shares is not regarded as indicating less satisfactory views as to the company's outlook, but is attributed to the heavy liquidation shown in many shares with an international market. Triplex Safety Glass rallied to 57s. 6d., and have a much steadier appearance. There was also a firmer tendency reported in Borax Consolidated, which were better at 29s. 3d.

In other directions International Combustion have moved up strongly to 112s. 6d., attention being drawn to the favourable yield offered on the basis of last year's 30 per cent. dividend. Murex were better, but British Oxygen failed to benefit from market anticipations that the forthcoming interim dividend will be maintained and that at the same time the directors may issue a statement as to progress. Richard Thomas, Dorman Long and most iron, steel and kindred shares were in request on any decline in price.

Oil shares were lower, in common with most shares dealt in internationally, but Anglo-Iranian and most of the leading companies continue to be the subject of favourable dividend estimates.

Weekly Prices of British Chemical Products

THE trade in general chemicals continues along steady lines the demand being well up to normal for the period. Movements outside contract deliveries are mostly for small parcels, but the volume of fresh business for spot delivery is nevertheless satisfactory. Nearly all the potash and soda products are in the usual regular demand and a fair inquiry is maintained for solvents. Formaldehyde and salammoniac are enjoying an active demand and quotations are reported competitive. The decline in metal prices has had a weakening influence on a number of items but there are no outstanding price alterations to record for rubber chemicals, wood distillation products or general chemicals. Values on the whole are steady as quoted with a firm undertone. In the coal tar section trade is definitely slow there being little or no interest in spot transactions. Market requirements are more or less satisfied for the remainder of the year, and there will be little active interest displayed until contracts come up for renewal. Prices throughout this section are steady with a very firm undertone.

MANCHESTER.—With a certain amount of nervousness apparent on the Manchester chemical market during the past week fresh business in most directions has been only on a relatively quiet scale, although, on the whole, sellers report a fairly steady flow of specifications for deliveries against existing contracts. Most of the heavy chemicals are being taken up in reasonably steady quantities and apart from continued weakness in the metal compounds as a result of the slump in the metals chemical prices generally are well maintained. In the by-products section sales this week have been rather slow, but there has been little giving way in prices. Carbolic acid is firm and in active demand so far as crystals are concerned, whilst values of pyridine have further advanced on the pronounced shortage of supplies.

GLASGOW.—There has been a further improvement in the demand for home trade during the week. But export business still continues very restricted. Copper, lead and zinc products are again easier on account of the fall in metal prices; otherwise prices remain very firm at about previous figures, with a tendency towards higher levels.

General Chemicals

ACETONE.—£45 to £47 per ton.

ACETIC ACID.—Tech., 80%, £28 5s. per ton; pure 80%, £30 5s.; tech., 40%, £15 12s. 6d. to £18 12s. 6d.; tech., 60%, £23 10s. to £25 10s. MANCHESTER: 80%, commercial, £30 5s.; tech. glacial, £42 to £46.

ALUM.—Loose lump, £8 7s. 6d. per ton d/d; GLASGOW: Ground, £10 7s. 6d. per ton; lump, £9 17s. 6d.

ALUMINIUM SULPHATE.—£7 per ton d/d Lancs.; GLASGOW: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 1s. to 1s. 1d. per lb. d/d in cylinders. SCOTLAND: 10½d. to 1s. 0½d., containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM CARBONATE.—£20 per ton d/d in 5 cwt. casks.

AMMONIUM CHLORIDE.—Grey galvanising, £17 10s. per ton, ex wharf.

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

AMMONIUM DICHROMATE.—8d. per lb. d/d U.K.

ANTIMONY OXIDE.—£68 per ton.

ARSENIC.—Continental material £11 per ton c.i.f., U.K. ports; Cornish White, £12 5s. to £12 10s. per ton f.o.r., mines, according to quantity.

BARIUM CHLORIDE.—£11 10s. to £12 10s. per ton in casks ex store. GLASGOW: £11 10s. per ton.

BLEACHING POWDER.—Spot, 35/37%, £8 15s. per ton in casks, special terms for contracts. SCOTLAND: £9 per ton net ex store.

BORAX COMMERCIAL.—Granulated, £16 per ton; crystal, £17; powdered, £17 10s.; extra finely powdered, £18 10s., packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Granulated, £16, crystal, £17; powdered, £17 10s. per ton in 1-cwt. bags, carriage paid.

BORIC ACID.—Commercial granulated, £28 10s. per ton; crystal, £29 10s.; powdered, £30 10s.; extra finely powdered, £32 10s. in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Crystals, £29 10s.; powdered, £30 10s. 1-cwt. bags in 1-ton lots.

CALCIUM BISULPHITE.—£6 10s. per ton f.o.r. London.

CHARCOAL, LUMP.—£6 to £6 10s. per ton, ex wharf. Granulated, £7 to £9 per ton according to grade and locality.

CHROMETAN.—Crystals, 2½d. per lb.; liquor, £19 10s. per ton d/d. station in drums. GLASGOW: 70/75% solid, £5 15s. per ton net ex store.

CHROMIC ACID.—9¼d. per lb., less 2½%; d/d U.K.

CITRIC ACID.—1s. 0¼d. per lb. MANCHESTER: 1s. SCOTLAND: B.P. crystals, 1s. 0¼d. per lb., less 5%, ex store.

COPPER SULPHATE.—£21 7s. 6d. per ton, less 2% in casks. MANCHESTER: £19 10s. per ton f.o.b. SCOTLAND: £22 per ton, less 5%, Liverpool, in casks.

CREAM OF TARTAR.—100%, 92s. per cwt., less 2½%. GLASGOW: 99%, £4 12s. per cwt. in 5-cwt. casks.

FORMALDEHYDE.—£22 10s. per ton.

FORMIC ACID.—85%, in carboys, ton lots, £42 to £47 per ton.

GLYCERINE.—Chemically pure, double distilled, 1.260 s.g., in tins, £5 7s. 6d. to £6 7s. 6d. per cwt. according to quantity; in drums, £5 to £5 13s. 6d.

HYDROCHLORIC ACID.—Spot, 5s. to 7s. 6d. carboy d/d according to purity, strength and locality.

IODINE.—Resublimed B.P., 6s. 4d. per lb. in 7 lb. lots.

LACTIC ACID.—(Not less than ton lots) Dark, 50% by volume, £23 10s.; by weight, £27 10s.; Pale, 50% by volume, £27; by weight, £32 per ton. LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50%, by vol., £41. One-ton lots ex works, barrels free.

LEAD ACETATE.—LONDON: White, £31 10s. ton lots; brown, £35. GLASGOW: White crystals, £35 10s.; brown, £1 per ton less. MANCHESTER: White, £36; brown, £35.

LEAD NITRATE.—£34 per ton for 1-ton lots.

LEAD, RED.—£33 15s. per ton, less 2½% carriage paid. SCOTLAND: £33 per ton, less 2½%, carriage paid for 2-ton lots.

LITHARGE.—SCOTLAND: Ground, £34 per ton, less 2½%, carriage paid for 2-ton lots.

MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store.

MAGNESIUM CHLORIDE.—SCOTLAND: £7 10s. per ton.

MAGNESIUM SULPHATE.—Commercial, £5 10s. per ton, ex wharf.

MERCURY.—Ammoniated B.P. (white precip.), lump, 5s. 11d per lb.; powder B.P., 6s. 1d.; biehloride B.P. (corros. sub.) 5s. 2d.; powder B.P. 4s. 10d.; chloride B.P. (calomel), 5s. 11d.; red oxide cryst. (red precip.), 7s.; levig. 6s. 6d.; yellow oxide B.P. 6s. 4d.; persulphate white B.P.C., 6s. 1d.; sulphide black (hyd. sulph. cum sulph. 50%), 6s. For quantities under 112 lb., 1d. extra.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NITRIC ACID.—80° Tw. spot, £16 10s. per ton makers' works.

OXALIC ACID.—£48 15s. to £57 10s. per ton, according to packages and position. GLASGOW: £2 9s. per cwt. in casks. MANCHESTER: £49 to £54 per ton ex store

PARAFFIN WAX.—SCOTLAND: 3¾d. per lb.

POTASH CAUSTIC.—Solid, £35 5s. to £36 15s. per ton for 2-ton lots ex store; broken, £42 per ton. MANCHESTER: £39.

POTASSIUM CHLORATE.—£36 7s. 6d. per ton. GLASGOW: 4¼d. per lb. MANCHESTER: £38 per ton.

POTASSIUM DICHROMATE.—SCOTLAND: 5d. per lb., net, carriage paid.

POTASSIUM IODIDE.—B.P. 5s. 6d per lb. in 7 lb. lots.

POTASSIUM NITRATE.—£27 per ton. GLASGOW: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 9¾d. per lb. SCOTLAND: B.P. Crystals, 9¾d. MANCHESTER: B.P. 10¾d. to 1s.

POTASSIUM PRUSSIATE.—6½d. per lb. SCOTLAND: 7d. net, in casks, ex store. MANCHESTER: Yellow, 6½d.

SALAMMONIAC.—Dog-tooth crystals, £36 per ton, fine white crystals, £16 10s. per ton, in casks, ex store. GLASGOW: Large crystals, in casks, £37 10s.

SALT CAKE.—Unground, spot, £3 to £3 10s. per ton.

SODA ASH.—58% spot, £5 17s. 6d. per ton f.o.r. in bags.

SODA, CAUSTIC.—Solid, 76/77° spot, £12 10s. per ton d/d station. SCOTLAND: Powdered 98/99%, £18 10s. in drums, £19 5s. in casks, Solid 76/77° £15 12s. 6d. in drums; 70/73%, £15 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts, 10s. per ton less.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£18 per ton carriage paid North. GLASGOW: £18 per ton net ex store.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. GLASGOW: £13 5s. per ton in 1 cwt. kegs, £11 5s. per ton in 2-cwt. bags. MANCHESTER: £10 10s.

SODIUM BISULPHITE POWDER.—60/62%, £20 per ton d/d 1 cwt. iron drums for home trade.

SODIUM CARBONATE MONOHYDRATE.—£15 5s. per ton d/d in minimum ton lots in 2 cwt. free bags.

SODIUM CHLORATE.—£26 10s. to £30 per ton. GLASGOW: £1 10s. per cwt., minimum 3 cwt. lots.

SODIUM CHROMATE.—4d. per lb. d/d U.K.

SODIUM DICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount 5%. MANCHESTER: 4d. per lb. GLASGOW: 4d., net, carriage paid.

SODIUM HYPOSULPHITE.—Pea crystals, £14 10s. per ton for 2-ton lots; commercial, £11 5s. per ton. MANCHESTER: Commercial, £11; photographic, £15 10s.

SODIUM METASILICATE.—£14 per ton, d/d U.K. in cwt. bags.
SODIUM NITRATE.—Refined, £8 per ton for 6-ton lots d/d.
SODIUM NITRITE.—£18 5s. per ton for ton lots.
SODIUM PERBORATE.—10%, 9¼d. per lb. d/d in 1-cwt. drums.
SODIUM PHOSPHATE.—£10 10s. to £11 per ton delivered (Di-basic).
SODIUM PRUSSIATE.—d. per lb. for ton lots. GLASGOW: 5d. to 5⅜d. ex store. MANCHESTER: 4d. to 4⅜d.
SODIUM SILICATE.—£9 10s. per ton.
SODIUM SULPHATE (GLAUBER SALTS).—£3 per ton d/d.
SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 to £3 10s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 12s. 6d.
SODIUM SULPHIDE.—Solid 60/62%, Spot, £11 5s. per ton d/d in drums; crystals 30/32%, £8 15s. per ton d/d in casks. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8 10s.
SODIUM SULPHITE.—Pea crystals, spot, £13 10s. per ton d/d sta- of 5 cwt. and upwards. MANCHESTER: 1s. 1½d. per lb.
SULPHUR PRECIP.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.
SULPHURIC ACID.—168° Tw., £4 11s. to £5 1s. per ton; 140° Tw., arsenic-free, £3 to £3 10s.; 140° Tw., arsenious, £2 10s.
TARTARIC ACID.—1s. 1½d. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. MANCHESTER: 1s. 1¼d. per lb. GLASGOW: 1s. 1d. per lb.
ZINC SULPHATE.—Tech., £12 10s. f.o.r., in 2 cwt. bags.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 7d. to 1s. 2d. per lb., according to quality. Crimson, 1s. 6d. to 1s. 7½d. per lb., according to quality
ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.
BARYTES.—£6 to £6 10s. per ton, according to quality.
CADMIUM SULPHIDE.—7s. 8d. to 7s. 11d. per lb.
CARBON BLACK.—4⅜d. per lb., ex store.
CARBON DISULPHIDE.—£31 to £33 per ton, according to quantity, drums extra.
CARBON TETRACHLORIDE.—£41 to £46 per ton, according to quantity, drums extra.
CHROMIUM OXIDE.—Green, 1s. 2d. per lb.
DIPHENYLGUANIDINE.—2s. 2d. per lb.
INDIA-RUBBER SUBSTITUTES.—White, 4⅜d. to 5½d. per lb.; dark 4d. to 4½d. per lb.
LAMP BLACK.—£28 to £30 per ton del., according to quantity. Vegetable black, £35 per ton upwards.
LEAD HYPOSULPHITE.—9d. per lb.
LITHOPONE.—30%, £16 10s. to £17 5s. per ton.
SULPHUR.—£9 to £9 5s. per ton. SULPHUR PRECIP. B.P., £55 to £60 per ton. SULPHUR PRECIP. COMM., £50 to £55 per ton.
SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quantity.
VERMILLION.—Pale, or deep, 5s. 3d. per lb., 1-cwt. lots.
ZINC SULPHIDE.—£58 to £60 per ton in casks ex store, smaller quantities up to 1s. per lb.

Nitrogen Fertilisers

AMMONIUM SULPHATE.—The following prices have been announced for neutral quality basis 20.6 = nitrogen, in 6-ton lots delivered farmer's nearest station up to June 30, 1938: October, 1937, £7 6s. 6d. per ton; November, £7 8s.; December, £7 9s. 6d.; January, 1938, £7 11s.; February, £7 12s. 6d.; March/June, £7 14s.
CALCIUM CYANAMIDE.—The following prices are for delivery in 5-ton lots, carriage paid to any railway station in Great Britain up to June 30, 1938: October, 1937, £7 8s. 9d. per ton; November, £7 10s.; December, £7 11s. 3d.; January, 1938, £7 12s. 6d.; February, £7 13s. 9d.; March, £7 15s.; April/June, £7 16s. 3d.
NITRO CHALK.—£7 10s. 6d. per ton for delivery up to June 30, 1938.
SODIUM NITRATE.—£8 per ton for delivery up to June 30, 1938.
CONCENTRATED COMPLETE FERTILISERS.—£11 4s. to £11 13s. per ton in 6-ton lots to farmer's nearest station.
AMMONIUM PHOSPHATE FERTILISERS.—£10 19s. 6d. to £14 16s. 6d. per ton in 6-ton lots to farmer's nearest station.

Coal Tar Products

BENZOL.—At works, crude, 9½d. to 10d. per gal.; standard motor, 1s. 3d. to 1s. 3½d.; 90%, 1s. 4d. to 1s. 4½d.; pure, 1s. 8d. to 1s. 8½d. GLASGOW: Crude, 10d. to 10½d. per gal.; motor, 1s. 4d. to 1s. 4½d.
CARBOLIC ACID.—Crystals, 7⅜d. to 8½d. per lb., small quantities would be dearer; Crude, 60's, 4s. to 4s. 3d., dehydrated, 4s. 6d. to 4s. 9d. per gal. MANCHESTER: Crystals, 10d. per lb. f.o.b. in drums; crude, 4s. 4d. per gal. GLASGOW: Crude, 60's, 4s. 3d. to 4s. 6d. per gal.; distilled, 60's.
CREOSOTE.—Home trade, 6¼d. to 6⅜d. per gal., f.o.r. makers' works; exports, 6⅜d. to 6⅝d. per gal., according to grade. MANCHESTER: 5¼d. to 6¼d. GLASGOW: B.S.I. Specification, 6d. to 6¼d. per gal.; washed oil, 5d. to 5¼d.; lower sp. gr. oils, 5⅜d. to 6¼d.
CRESYLIC ACID.—97/99%, 5s. to 5s. 2d.; 99/100%, 5s. to 5s. 9d. per gal., according to specification; Pale, 99/100%, 5s. 3d. to 5s. 5d. per gal.; Dark, 95%, 4s. 5d. to 4s. 7d. per gal. GLASGOW: Pale, 99/100%, 5s. to 5s. 6d. per gal.; pale 97/99%, 4s. 6d. to 4s. 10d., dark, 97/99%, 4s. 3d. to 4s. 6d.; high boiling acids, 2s. to 2s. 6d. American specification, 4s. 3d. to 4s. 6d. MANCHESTER: Pale, 99/100%, 4s. 8d.
NAPHTHA.—Solvent, 90/160, 1s. 6¼d. to 1s. 7½d. per gal.; solvent, 95/160%, 1s. 8d. to 1s. 9d., naked at works; heavy 90/190%, 1s. 1½d. to 1s. 3d. per gal., naked at works, according to quantity. GLASGOW: Crude, 6½d. to 7½d. per gal.; 90%, 160, 1s. 5d. to 1s. 6d., 90%, 190, 1s. 1d. to 1s. 3d.
NAPHTHALENE.—Crude, whizzed or hot pressed, £9 to £10 per ton; purified crystals, £18 per ton in 2-cwt. bags. LONDON: Fire lighter quality, £5 10s. to £7 per ton. GLASGOW: Fire lighter, crude, £6 to £7 per ton (bags free). MANCHESTER: Refined, £19 per ton f.o.b.
PITCH.—Medium, soft, 38s. per ton, f.o.b. MANCHESTER: 36s. 6d. f.o.b., East Coast. GLASGOW: f.o.b. Glasgow, 35s. to 37s. per ton; in bulk for home trade, 35s.
PYRIDINE.—99/140%, 12s. to 14s. per gal.; 90/160%, 11s. to 12s. per gal.; 90/180%, 3s. to 3s. 6d. per gal., f.o.b. GLASGOW: 90% 140, 10s. to 12s. per gal.; 90% 160, 9s. to 10s.; 90% 180, 2s. 6d. to 3s. MANCHESTER: 12s. to 13s. 6d. per gal.
TOLUOL.—90%, 1s. 11d. per gal.; pure, 2s. 5d. GLASGOW: 90%, 120, 1s. 10d. to 2s. per gal.
XYLOL.—Commercial, 2s. 3d. per gal.; pure, 2s. 5d. GLASGOW: Commercial, 2s. to 2s. 1d. per gal.

Wood Distillation Products

CALCIUM ACETATE.—Brown, £8 to £8 10s. per ton; grey, £10 10s. to £11 10s. Liquor, brown, 30° Tw., 6d. to 8d. per gal. MANCHESTER: Brown, £9 10s.; grey, £11 10s.
METHYL ACETONE.—40-50%, £42 to £45 per ton.
WOOD CREOSOTE.—Unrefined 6d. to 9d. per gal., according to boiling range.
WOOD, NAPHTHA, MISCIBLE.—2s. 8d. to 3s. 3d. per gal.; solvent, 3s. 6d. to 3s. 9d. per gal.
WOOD TAR.—£3 to £8 per ton, according to quality.

Intermediates and Dyes

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.
ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.
BENZIDINE, HCl.—2s. 5d. per lb., 100% as base, in casks.
BENZOIC ACID, 1914 B.P. (ex toluol).—1s. 9½d. per lb. d/d buyer's works.
m-CRESOL 98/100%.—1s. 8d. to 1s. 9d. per lb. in ton lots.
o-CRESOL 30/31° C.—6½d. to 7½d. per lb. in 1-ton lots.
p-CRESOL, 34-5° C.—1s. 7d. to 1s. 8d. per lb. in ton lots.
DICHLORANILINE.—1s. 11½d. to 2s. 3d. per lb.
DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.
DINITROBENZENE.—7½d. per lb.
DINITROCHLORBENZENE, SOLID.—£72 per ton.
DINITROTOLUENE.—48/50° C., 8½d. per lb.; 66/68° C., 10d.
DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works
GAMMA ACID.—Spot, 4s. per lb. 100% d/d buyer's works.
H ACID.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.
NAPHTHIONIC ACID.—1s. 8d. per lb.
α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.
β-NAPHTHOL.—9½d. to 9⅝d. per lb.; flake, 9½d. to 9⅝d.
α-NAPHTHYLAMINE.—Lumps, 1s. per lb.; ground, 1s. 0½d. in casks.
β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb., d/d buyer's works.
NEVILLE AND WINTHER'S ACID.—Spot, 3s. per lb. 100%.
o-NITRANILINE.—3s. 11d. per lb.
m-NITRANILINE.—Spot, 2s. 7d. per lb. d/d buyer's works.
p-NITRANILINE.—Spot, 1s. 8d. to 2s. 1d. per lb. d/d buyer's works.
NITROBENZENE.—Spot, 4½d. to 5d. per lb., in 90-gal. drums, drums extra. 1-ton lots d/d buyer's works.
NITRONAPHTHALENE.—9½d. to 10d. per lb.; P.G., 1s. 0½d. per lb.
SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb., 100% d/d buyer's works.
SULPHANILIC ACID.—Spot, 8d. per lb. 100%, d/d buyer's works.
o-TOLUIDINE.—10½d. per lb., in 8/10-cwt. drums, drums extra.
p-TOLUIDINE.—1s. 10½d. per lb., in casks.
m-XYLIDINE ACETATE.—4s. 3d. per lb., 100%.

Latest Oil Prices

LONDON, Oct. 20.—LINSEED OIL was steady. Spot, £32 per ton (small quantities); Nov. to April, £29 7s. 6d.; May to Decem. £29 5s., naked. SOYA BEAN OIL was dull. Oriental, spot, ex tank Rotterdam, £22 10s. per ton. RAPE OIL was inactive. Crude extracted, £37 per ton; technical refined, £38, naked, ex wharf. COTTON OIL was steady. Egyptian crude, £22 per ton; refined common edible, £26 5s.; deodorised, £28 5s., naked, ex mill (small lots £1 10s. extra). TURPENTINE was steady. American, spot, 32s. per cwt.; Nov.-Dec. delivery, 32s. 3d.; Jan.-April, 33s. 3d.
HULL.—LINSEED OIL.—Spot, quoted £30 10s. per ton; Oct., £30; Nov.-Dec., £29 15s.; Jan.-April, £29 7s. 6d.; May-Aug., £29 5s. COTTON OIL.—Egyptian, crude, spot, £22 10s. per ton; edible, refined, spot, £25 10s.; technical, spot, £25 10s.; deodorised, £27 10s., naked. PALM KERNEL OIL.—Crude, f.m.q., spot, £23 10s. per ton, naked. GROUNDNUT OIL.—Extracted, spot, £30 per ton; deodorised, £33. RAPE OIL.—Extracted, spot, £36 per ton; refined £37. SOYA OIL.—Extracted, spit, £29 16s. per ton; deodorised, £32 10s. COD OIL.—F.o.r. or f.a.s., 27s. 6d. per cwt., in barrels. CASTOR OIL.—Pharmaceutical, 45s. 6d. per cwt.; first 40s. 6d.; second, 38s. 6d. TURPENTINE, American, spot, 34s. 6d. per cwt.

Forthcoming Events

Newcastle.

October 25.—Bedson Club (Newcastle-on-Tyne), at the Chemistry Lecture Theatre, King's College, at 6.30 p.m. Professor G. J. Finch, "Electron Diffraction on Surfaces."

Leeds.

October 26.—Society of Chemical Industry. J. E. Such, "The Use of Phosphates," H. Whittaker, "The Bower-Barff Process."

London.

October 28.—Chemical Club at Whitehall Court, London, S.W.1, at 8 p.m. Annual General Meeting.

Chemical Society at Burlington House, Piccadilly, W.1, at 5.30 p.m. Professor C. H. Desch, the Le Chatelier Memorial Lecture.

Coke Oven Managers' Association at Hotel Victoria, Northumberland Avenue, at 6.45 p.m. for 7.15 p.m. Annual Dinner.

November 1.—Society of Chemical Industry at Burlington House, Piccadilly, W.1, at 8 p.m. Joint Meeting with the Road and Building Materials Group. W. G. Adam and co-workers, "The Constitution of Coal Tars."

November 3.—Society of Public Analysts and Other Analytical Chemists, at Burlington House, Piccadilly, W.1, at 8 p.m. Ordinary Meeting.

Swansea.

October 28.—Chemical Society at the Chemical Lecture Theatre, University College, at 6 p.m. Dr. S. Glasstone, "Some Aspects of Electrolytic Oxidation."

Nottingham.

October 29.—Chemical Society (Nottingham Section) at the University College, University Park, at 5.30 p.m. Professor A. C. Chibnall, "The Biochemistry of the Waxes."

Hull.

November 2.—Hull Chemical Engineering Society at the Hull Photographic Society's Room, Grey Street, Park Street at 7.45 p.m. Hugh Griffiths, "Solvent Recovery by Absorption Processes."

Liverpool.

November 2.—Chemical Society at the Chemistry Lecture Theatre of the University, at 6 p.m. Professor R. G. W. Norrish, "Recent Developments in the Study of Free Radicals by Photo-chemical Methods."

Birmingham.

November 2.—Electrodepositors' Technical Society, at the James Watt Memorial Institute, Gt. Charles Street, at 7.30 p.m. A. I. Wynne-Williams, "The Production of Nickel Sheets by Electrodeposition."

Company News

Brown, Bayley's Steel Works announce the year's dividend to July 31, 1937, on 5 per cent. cumulative preference shares.

Murex, Ltd., states that the half-year's dividend of 3½ per cent., less tax, on the 7 per cent. cumulative preference shares will be payable November 1.

Van Den Bergh's Fabrieken have announced an interim on the 15 per cent. preferred ordinary "A" shares for year to December 31 next, payable November 1.

Anglo-Continental Guano Works have announced a final dividend of 3¾ per cent., making 7½ per cent., less tax (same) on the ordinary shares for the year ended June 30.

Viking Whaling state that the dividend for the year ending October 31 next on the 7 per cent. cumulative convertible preference shares will be paid on November 1.

Ilford, Ltd., manufacturers of photographic plates, etc., announce that dividends of 6 per cent. and 5½ per cent. cumulative preference shares for half-year ending October 31 will be paid, less tax, on November 1.

Fison, Packard and Prentice, Ltd., manufacturers of chemical fertilisers, etc., have recommended a final dividend of 6½ per cent., less tax, on the ordinary shares, making 9 per cent. for the year ended June 30, 1937. This is the same as for the past two years, but is payable on the increased ordinary capital of £832,500. Issued capital totals £1,574,860, of which £242,360 is in 7 per cent. preference shares and £500,000 in 5 per cent. second cumulative preference shares.

Sadler and Co., manufacturing chemists and tar distillers, in their report for the year ended June 30, shows balance of profit, including £3,411 brought in, of £23,795 (£19,224). To depreciation, £10,000 (£7,500); final dividend of 7 per cent., less tax, making 10 per cent.; forward, £2,965. Rearrangement of capital sanctioned by High Court on July 10, 1936, has been given effect to in balance-sheet. In January, out of gain on realisation of investments, there was distributed 2s. per share, or 10 per cent., not liable to tax.

Potash Syndicate of Germany have announced the numbers of £43,610 6½ per cent. sterling bonds, series "C" drawn for repayment at 102½ on January 1 next.

Sternol, Ltd., manufacturers and retailers of petroleum products, have announced a dividend of 4 per cent. actual, less tax, on account of arrears on the 8 per cent. cumulative participating preferred ordinary shares.

Colvilles, Ltd., iron and steel manufacturers, is beginning interim dividends on the £3,919,550 of ordinary stock with a payment of 3 per cent., less tax. For the whole of 1936 the company paid an initial dividend of 7 per cent.

Greeff-Chemicals Holdings have announced an interim of 4 per cent. actual, less tax, on ordinary stock on account of 1937, payable November 1 to stockholders registered October 15. (For period June 5-December 31, 1936, 6½ per cent. actual was paid.)

Midland Tar Distillers, Ltd., in their report for the year ended June 30, 1937, state that profit, including dividends on investments, was £17,892; deduct amount transferred to Debenture Redemption reserve £6,667, leaving £41,225; add £20,541 brought forward, making £61,766. Final dividend on ordinary shares of 2½ per cent., free of tax, making 5 per cent., free of tax (same); to obsolescence and depreciation reserve £15,000; forward, £22,146.

New Companies Registered

Desitin Products, Ltd.—Private company. Registered October 16. Capital £1,000 in 1,000 shares of £1 each. To carry on business as manufacturers of and dealers in chemicals, gases, drugs, plaster of Paris, gypsum, plasters, etc. Directors: Carl Klinke, Max Berthold Klein and Wolfram von Gugel. Solicitors: Albert Fletcher and Co., 23 College Hill, E.C.4.

Cefonin Company, Ltd.—Private company. Registered October 14. Capital, £1,000 in 200 shares of £5 each. To carry on the business of manufacturers of and dealers in pharmaceutical preparations, chemicals, gases, drugs, medicines, etc. Subscribers: Fernand M. Dupre, 11 New Court, W.C.2, advocate; and John A. Steemson, 19 Kyrle Road, S.W.11, company secretary.

Diggle Products Company, Ltd.—Private company. Registered October 15. Capital, £1,000 in 1,000 shares of £1 each. To carry on the business of manufacturers of and dealers in paints, stains, varnish, enamel, polish, lacquer, shellac, cellulose, etc. Directors: Samuel Diggle (permanent managing director), 54 Keep Hill Drive, High Wycombe; Brian Diggle, Agnes Dymott, Mary Dymott. Solicitors: Allan Janes and Co., High Wycombe.

Whittaker Howarth, Ltd.—Private company. Registered October 16. Capital £600 in 600 shares of £1 each. To carry on the business of manufacturers of and dealers in soaps, soap powders, bleaching powders, washing materials, starch, oils, greases, oleaginous and saponaceous substances, etc. Subscribers: Whittaker Howarth, 52 Ringley Road, Whitefield, motor engineer; John Nightingale, Market Chambers, Radcliffe, solicitor. Solicitors: Reg. Clayton and Co., Market Chambers, Radcliffe.

Mantis Polish Company, Ltd.—Private company. Registered October 12. Capital, £1,000 in 10,000 5 per cent. cumulative participating preference shares of 1s. each, and 500 ordinary shares of £1 each. To acquire the business of a manufacturer of and dealer in polishes carried on by H. Tantram, at Theale, Reading. Directors: Alexander Leckie (chairman), 31 Disraeli Gardens, S.W., and Harold Tantram, Haywards House, Theale, Berks. Registered office: 118 Chancery Lane, W.C.2.

Chemika, Ltd.—Private company. Registered October 16. Capital, £1,000 in 1,000 shares of £1 each. To carry on the business of manufacturing, research and analytical chemists, factors and wholesalers of fine and heavy chemicals, etc. Directors: Moss Shara, 147 Holmleigh Road, N.16, merchant; David S. Conn, 115 Whitechapel High Street, E.1, dentist, and Kurt Kayem, 10 Kyverdale Road, N.16, chemist. Registered office: 126-7 Whitechapel High Street, E.1.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

British India.—A Parsi firm of manufacturers' agents established at Bombay wish to obtain the representation, on a commission basis, for Bombay Presidency or the whole of India, of United Kingdom manufacturers of chemicals and patent medicines. (Ref. No. 256.)

The Director of Contracts, Army Headquarters, Simla, invites tenders for 200 tons brimstone, best thirds. Forms of tender obtainable from the Director-General, India Store Department, Belvedere Road, Lambeth, London, S.E.1. Tenders must be cabled direct to the Director of Contracts, A.H.Q., Simla, to reach him not later than October 28, 1937.